May/June 2009 >> Vol.42

AECMAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT



The parametric revolution

Complex modelling comes of age

Design visualisation • Civil engineering • Dell mobile workstations

AECMAGAZINE
DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

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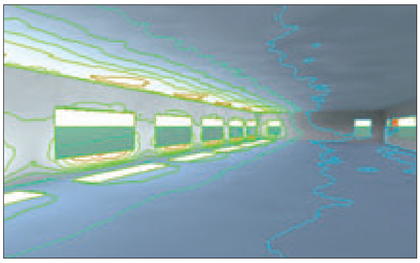
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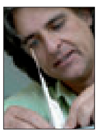
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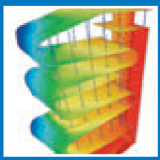








Nemetschek Scia delivers 2009 structural releases



Nemetschek Scia has launched the 2009 versions of its software solutions for the structural engineering sector. Scia Engineer 2009 is used to analyse, design and detail any type of structure while Scia Steel 2009 is a steel fabrication solution which includes Bill of Materials (BOM), links to CNC machines, production planning, stock control and more. ***www.scia-online.com***

Ricoh enters high-volume wide format print market

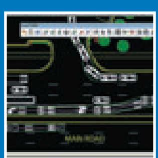


Ricoh has introduced two wide format digital imaging systems with colour scanning capability, the Aficio MP W5100 and MP W7140. These products signify the company's first entry into the high-volume, wide format marketplace, which is classified by Ricoh as any wide format machine capable of producing outputs at 10 pages per minute (ppm) or more. The Aficio MP W5100/MP W7140 feature output speeds up to 10 and 14 ppm respectively, high resolution colour scanning at up to 1,200 dots per inch (dpi) and a wide range of colour or black-and-white scanning options. ***www.ricoh.com***

Government funding channelled to CAD training

A new Government backed scheme is allowing firms to take advantage of special funding grants for CAD training, says CADline. The provider of AEC software and training is now offering up to £1,000 of funding to eligible firms wanting to book on one of its CAD training courses. This offer comes as part of the Government's drive to promote learning and skills development in the recession and it has recognised CAD training as an important area. CADline provides a wide range of training courses including AutoCAD, AutoCAD Architecture, Revit Architecture and AutoCAD MEP, as well as geospatial, visualisation, sustainability, and MicroStation. ***www.cadline.co.uk***

Transoft Solutions ships AutoTurn 6.1 software



Transoft Solutions is shipping Version 6.1 of its swept-path analysis software, AutoTurn. The new release now supports AutoCAD 2010 and features a database technology that is compatible with Microsoft 64-bit operating systems. AutoTurn 6.1 is also fully compatible with the company's Torus Roundabouts and InVision for AutoTurn software. ***www.transoftsolutions.com***

Bentley to revolutionise workflow for markup on paper drawings

Bentley has launched a new digital solution designed to streamline traditional paper-based redline workflows while at the same time reducing errors. ProjectWise Dynamic Plot enables project teams to redline engineering and architectural paper drawings, while the system automatically feeds back this information directly into the source CAD files that created them.

According to Bentley, project teams still review and markup more drawings on paper than in any other medium. However, transferring this information back into a digital environment requires marked up paper copies to be scanned or the markups from the paper manually transferred into the PC. This, according Joe Croser, global marketing director, Bentley, often leads to a backlog and can lead to errors. "Drawings that get marked up have no 'persistent' connection back to their source CAD files, making the markup transfer process from the paper back into the computer error-prone and risky," he says. "Accordingly, synchronising markups with the original source data is a slow and manual process, and the marked up drawings can easily be misplaced."

Looking to overcome these problems, Bentley's ProjectWise Dynamic Plot uses a digital pen, which captures mark-ups in real time while laying down red or green ink on the physical drawing. All of this data is stored inside the digital pen until it is docked, when it synchronises with the ProjectWise database and transfers the redline marks to a file that references the originating design data. The digital pen has a tiny built-in camera that can recognise unique patterns in drawings when they are plotted using a special version of Bentley's ProjectWise InterPlot software. Each drawing is given its unique 'DNA', which is immediately recognisable by the pen, and because of subtle changes that occur throughout the pattern, can also track the exact location of the pen on the drawing, accurate to 3mm - 6mm.

"We all thought that computers signalled the end for paper but, in reality, the more work we do on computers, the more paper we create," said Kevin van Haaren ProjectWise administrator of multidisciplinary firm, HNTB. "Because our



paper-based drawing review and markup workflows are slow, our digital data and paper markups are usually out of sync.

"ProjectWise Dynamic Plot will help us avoid errors and save time. We also believe this new collaboration tool will be extremely easy to implement by using our existing investments in printers, plotters, and ProjectWise, speeding up our workflows with minimal user training."

ProjectWise Dynamic Plot doesn't come cheap, with an initial outlay required for the service starting at $10,000 per year, packs of ten pens sold at $6,000, and then a 'pay as you go' model which comes into effect every time 'usable' markup data is synchronised with the system. However, because this technology is targeted predominantly at larger engineering firms, which often employ a dedicated team for feeding back redline changes manually, it is likely that these costs would be much easier to swallow, as Croser was keen to point out. "Every company we have shown this to which fits a larger company paradigm have just said 'when can we have it'? There isn't a cost issue for them because the project risks they get to mitigate as a result of this far outweighs any financial cost that we would look to recover from them. So for them it is not just about cost it is about speed and it is about mitigating risk."

www.bentley.com/ProjectWiseDynamicPlot

Integrated design is key focus for Allplan 2009

Nemetschek AG has introduced Allplan 2009, its flagship AEC platform for 3D building modelling with quantity takeoff and cost determination. The current version contains new tools for renovation and conversion planning, as well as for environmentally-friendly and sustainable building projects.

According to the developers the new version has a strong emphasis on user-friendliness, and also focuses on interdisciplinary co-operation with the integrated product family enabling users to work on a virtual building model covering everything from architecture design to structural planning, building services and cost planning.

"Modern design and building projects are extremely complex. They require integrated planning methods that connect architects, engineers, design professionals, tenderers, cost assessors and construction clients. With Allplan 2009, we provide an integrated solution that enables interdisciplinary co-operation among all project members using a shared database. This decisively improves the efficiency of building modelling," explains Peter Mehlstäubler, CEO of Nemetschek Allplan GmbH.

Allplan 2009 also includes new energy consulting tools geared towards energy efficiency and sustainability. The Allplan Energy Performance Certificate enables designers to derive energy-specific key figures directly from the building model. In addition, Allplan Building Simulation enables the dynamic calculation of heating and cooling loads and tools for setting up photovoltaic and solar-thermal installations. ***www.allplan.com***

MicroGDS

From concept ...

MicroGDS was created for architects and designers. Its unmatched graphics capabilities help you to develop and sell your concepts.



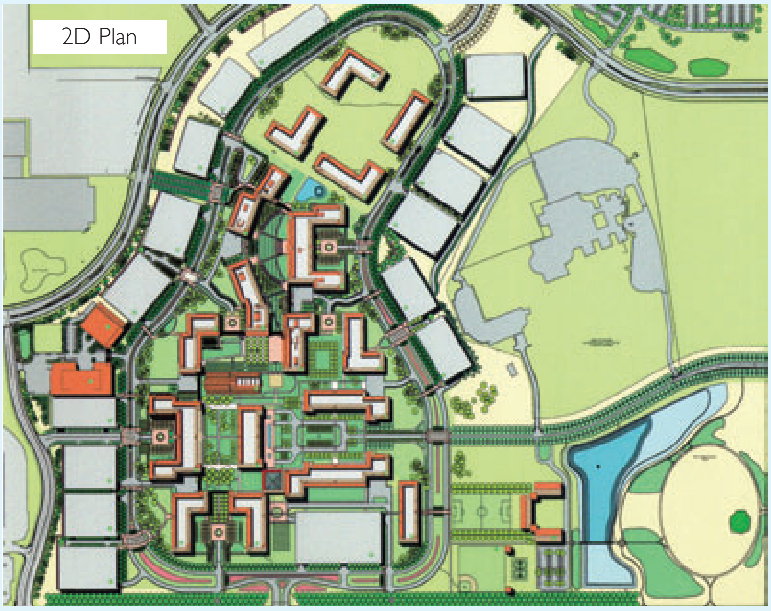


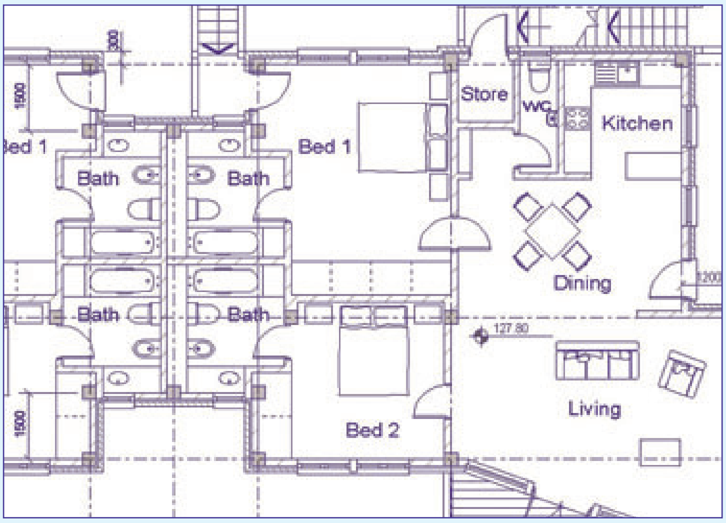
... to construction ...

Production drafting, presentation graphics, 3D modelling, and 3D rendering are all integrated in MicroGDS. You only have to pay once, and you don't need to waste time converting and managing multiple copies of your data.

... on any size project ...

Data capacity is unlimited, so you can grow your project team safe in the knowledge that they can all access project data simultaneously.





... in any organisation

If you need to exchange data with others, MicroGDS supports a wide range of formats including one of the best DWG/DXF translators on the market. There is also a .NET interface for customisation and application development.

The MicroGDS product family and its sister product Piranesi offer CAD users software that delivers a strong return on investment:

- ❑ Upgrade your software not your hardware, no need for expensive top-end workstations
- ❑ Multi-user access to the same project for quick turnaround of jobs
- ❑ PDF generation for easy distribution to all stakeholders in the project
- ❑ Assemble Word documents, Excel spreadsheets, and photos alongside your drawings. No need for costly DTP products.
- ❑ Solutions for 2D, 3D, single-user and multi-user configurations
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- ❑ Small file size for reduced storage costs
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- ❑ Browse and copy MicroGDS documents across the internet
- ❑ High quality WYSIWYG plotting
- ❑ Multi-threaded technology making full use of modern processors
- ❑ Billions of pounds of PFI work under Design in MicroGDS

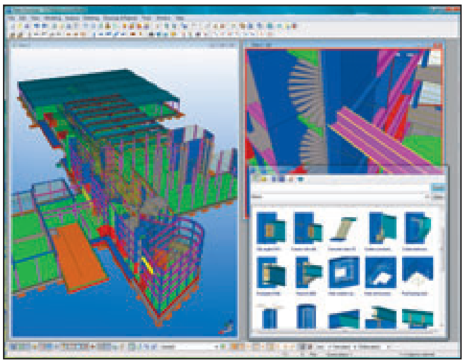
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Images courtesy of Jeff Radwell, Nigel Azis Ltd, London; TTSP, London; Hillier Architecture, USA; Scott Brownrigg, UK.

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Software International

Tekla unveils Structures 15 as acquisition builds UK presence



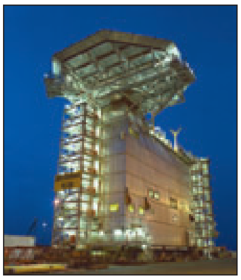
Tekla has released version 15 of its structural engineering focused BIM (Building Information Modelling) solution, Tekla Structures. The new features in Tekla Structures 15 concentrate on making modelling and detailing more intuitive, as well as improving construction project collaboration, management and delivery through enhanced interoperability and visualisation. In addition, there is a 64-bit version of Tekla Structures 15 available that enables users to tackle even bigger projects than before.

To help users benefit from the new features more quickly, Tekla provides online videos and tutorials for self-learning.

Meanwhile, Tekla has acquired the business of 3-Design LLC, a UK-based developer of structural engineering software that was previously known as 3D+. Tekla will provide dedicated support for all 3D+ users, however they will also be offered the opportunity to upgrade their software licenses to Tekla Structures.

"3-Design's customers have been provided with a good level of service over the years and we aim to continue the good work that has been done and improve on it where possible," promises Andrew Bellerby, managing director of Tekla UK. "Tekla is also committed to integrating our software products together and developing them further into an exquisite solution covering a much wider scope of the structural engineering and construction management workflow than has been available before. We understand the customers have invested heavily in the software both financially and time-wise and we are committed to moving them forward with improved solutions." ***www.tekla.com***

New software targets process / offshore structures



MultiSuite Software is taking a fresh look at offshore detailing and modelling by incorporating a Tubular or Pipe connections module into its software. The company's MultiSteel Offshore application has been developed specifically for the steel detailing and fabrication of structures in the offshore and process engineering industries.

According to its developers, the software simplifies drawing and production of even the most complex of designs, which it achieves by automating time-consuming tasks (such as calculations) and by incorporating a number of useful tools (as for irregular plate profiling). With the tubular and pipe connections module, pipes can be shown in all orientations in 3D and edited in any style, and drawing outputs can be fully customised to user requirements, such as wrap-around templates or cutting and CNC machinery output files. The software also links to other industry applications for analysis and design.

The main benefit of the MultiSteel Tubular connections module, claims MultiSuite, is that it can potentially increase the safety ratings of connections and generate significant long-term savings on replacement and repair of structures. This is because pipe connections present fewer edges on which corrosion can act when compared to regular plate welding.

www.multisuite.com

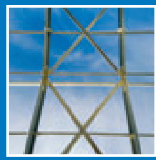
Structural Eurocodes drive development at Graitec

Structural software developer, Graitec has introduced Advance Design 2009, a finite elements analysis software for reinforced concrete and steel structures. Advance Design is aimed at structural engineers who require a solution for simulating and optimising all their projects. It includes a structural modeller, automatic load generators, an FEM engine, wizards for concrete and steel design, efficient post-processing and report generators. The 2009 release includes several new features and improvements, especially the implementation of the latest Eurocodes. These include the climatic generator, actions and load combinations (Eurocode 1), reinforced concrete design (Eurocode 2), steel shapes and connections design (Eurocode 3).

According to Graitec, it recognised the importance of implementing the new standards by developing the ability to set or to automatically calculate the wind loads pressure coefficients and by developing several calculation methods of slender columns (nominal curvature, nominal stiffness, general method, etc.). All analysis results can be obtained as detailed calculation reports.

In addition, Advance Design is provided with a validation guide, which helps the user to determine precisely the implementation level of these new standards in the software. With the partnership with ArcelorMittal, Graitec also provides the design of castellated beams according to Eurocode 3. ***www.graitec.com***

BSI offers free structural Eurocodes companion



BSI British Standards has published a 'companion guide' to the structural Eurocodes - the new pan-European set of standards for designing and building civil engineering works. This 56-page guide, which delivers practical and timely advice on how the new codes will work and how they might benefit construction professionals, is available for free download from the BSI website.

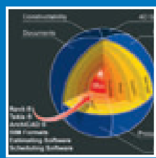
www.bsigroup.com/eurocodes

Creation lab opens doors for 3D printing services



The UK's newest 3D printing service provider, 3D Creation Lab, has opened for business, providing a multiple technology range of services and featuring an interactive on-line quoting process, which can see clients in receipt of their models within 24 hours of confirmation of order. 3D Creation Lab produces high-quality models using Objet's Polyjet technology and Z Corporation's colour printers. ***www.3dcreationlab.co.uk***

Vico extends construction management software



Vico Software, a specialist in 5D BIM for Construction, has announced the general availability of Vico Office, its latest solution for integrated construction management designed specifically for builders and owners. Vico Office offers a BIM-neutral environment where Revit, Tekla, and ArchiCAD files can be used in constructability analysis, co-ordination, 4D scheduling, and 5D cost planning.

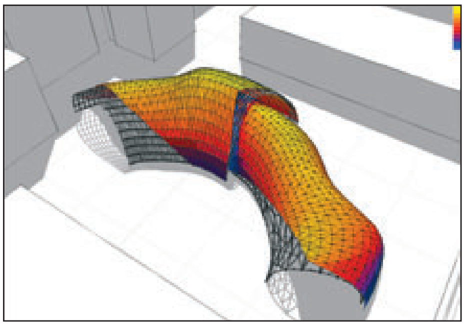
www.vicosoftware.com

Excitech delivers Autodesk videos on demand



Excitech has launched its Autodesk Videos on Demand covering the recently released 2010 Portfolio. These videos highlight some of the key new features in the mainstream Autodesk applications (including the AutoCAD and Revit platforms) and the benefits these can bring both to the end-user and design team. The short video presentations are CPD approved and typically last no longer than eight minutes. The presentations can be viewed on the Excitech web site ***www.excitech.co.uk/pr4*** and will be distributed via DVD shortly to Excitech's Autodesk Subscription Customers.

Green building design tools drive architectural design software



Development of green building design software is accelerating with new products introduced this month by Autodesk, Graphisoft and Integrated Environmental Solutions (IES).

Just as AEC Magazine was going to press, Autodesk was putting together the final touches to the UK version of Autodesk Ecotect Analysis 2010 (pictured), the building performance analysis tool that it acquired at the tail end of 2008. The software provides architects and engineers with a wide range of simulation and analysis functionality, designed to help users to better understand earlier in the design process how environmental factors — such as solar, thermal, shading, lighting and airflow — will affect building performance.

Graphisoft is also looking to get in on the 'green' action with EcoDesigner, a new building energy evaluation tool for ArchiCAD 12. EcoDesigner is designed to enable architects to control the energy consumption of their buildings and provide access to energy information in the early design phase.

IES, a specialist provider of integrated performance analysis software for sustainable building design, is gearing up for the June launch of its new architectural product, VE-Gaia. The software offers 'step-by-step' smart navigation that defines different sustainable design analysis processes by weaving a workflow through IES' Virtual Environment software. It is designed to enable users to undertake complex environmental performance analysis without the need for expert knowledge.

Dr Don Mclean, founder and CEO of IES, explained, "I see VE-Gaia revolutionising the way that building simulation is performed. Design firms will be able to open up sustainable design analysis to a wider range of users as you need significantly less familiarity with the VE software. Users can easily mark progress, control quality and iterate workflows. Environmental analysis feedback is a key driver for sustainable design."

Meanwhile, Graphisoft and IES have enhanced the ArchiCAD connection to IES, via gbXML to provide greater interoperability. The connection is available with ArchiCAD version 12 and the IES <Virtual Environment> suite of sustainable building energy and performance analysis tools version 5.9.1.

Finally, Autodesk has released its Guide to Sustainable Design, a new free online resource for designers that illustrates sustainable design principles, decisions and technologies for every phase of the building project lifecycle.

www.graphisoft.com / www.iesve.com
www.autodesk.com/ecotect

London architectural school turns to milling machines for urban design and building models

Students at the Architectural Association School of Architecture (the AA) in Central London are using two Roland DG MDX-540 milling machines to produce scale models of design concepts at the school's state of the art digital prototyping lab. Models produced using the MDX-540s include urban design proposals, landscapes and building components. The AA offers undergraduate, graduate and master degrees, and the models produced by students using the MDX-540s are critical elements of their studies.

Students typically mill models out of high-density foam or polyurethane modelling board, which is durable enough to ensure the models aren't easily damaged but can be milled at high speed by the MDX-540. The school uses its MDX-540s in conjunction with Rhino3D for design with ArtCam Pro and Mayka for the creation of tool paths.

The AA first opened its digital prototyping lab in summer 2007, with investment in its first MDX-540 along with two laser-cutting machines, a 3D printer and incorporating the existing larger 1,200 x 1,200 CNC machine. Before opening the lab, the students were forced to outsource their modelling requirements.

The experimental and creative nature of the prototyping



work produced by students means that there is huge variation in the work carried out by the machines and Jeroen van Ameijde, head of digital prototyping at the AA, says that the MDX-540's versatility and ease of use has made it popular with the students and the staff. "Every model we develop is unique and the precision of the MDX-540s unlocks many new possibilities for us. Custom settings are often required and these are easily input, making the MDX-540 suitable for experienced professionals and novices alike." ***www.rolanddg.com***

3Dconnexion launches ultimate SpacePilot Pro



The SpacePilot Pro is the latest 3D mouse from specialist manufacturer, 3Dconnexion. The new device features programmable buttons, axis locks and the addition of a colour LCD monitor, which not only provides visual guides to the context-sensitive short cut buttons, but can be used to preview Calendar and email from Outlook. Priced at £399 the SpacePilot Pro works with AutoCAD, MicroStation, SketchUp, ArchiCAD, Allplan and others. ***www.3dconnexion.com***

Holistic City enhances urban design software



Holistic City has released version 1.6.5 of CityCAD, its urban design software. CityCAD was created specifically for the city design, planning and development community. It enables users to draw a simple block model of a masterplan, and CityCAD will automatically calculate floor areas, unit numbers, densities, costs, values, carbon footprint and much more. If changes are made to the model (i.e. add a storey to a building or adjust the road layout), then all quantities are re-calculated instantly. ***www.holisticcity.co.uk***

Bluebeam offers free 'secure' PDF viewer

Bluebeam Software has announced the availability of Bluebeam PDF Revu, a free PDF viewer. Features include tabbed navigation for opening multiple files, MultiView technology for displaying up to 16 PDFs simultaneously and advanced search options for locating keywords and phrases in PDFs. According to the company, the release of Bluebeam PDF Revu is in response to recent security attacks on the Adobe Reader PDF viewer. With its 'secure' PDF Revu, all PDF files, whether opened from a network drive or downloaded from the Internet, are opened in Bluebeam's standalone application, Bluebeam PDF Revu, not in an Internet browser.
www.bluebeam.com/pdfviewer

Evolve to offer Generative Components training

Evolve Consultancy has added a new MicroStation Generative Components training course to its portfolio. The two day event introduces students to the fundamental concepts of the associative parametric modeling system through practical exercise and also allows attendees to contribute a problem or concept that they would like to explore in a workshop environment.
www.evolve-consultancy.com

SmartGeometry 09

Generative design is an application of parametric modelling technology that has quickly swept through the design schools and high-end architectural firms, and is now on the cusp of going mainstream. **Martyn Day** attended the key annual conference, SmartGeometry 09.

Signature architectural practices, such as Frank Gehry and Foster + Partners, have been using 3D modelling and innovative programming to create beautifully sculpted forms for a number of years to advance the vocabulary of architectural design. However, while momentum for advanced modelling is gaining pace, the skill-set of some graduates continues to lag behind in geometric knowledge.

To rectify this, and to skill the next generation of digital designers, a handful of industry luminaries set up the SmartGeometry group in 2001. The group represented a partnership between practice, research and academia and included High Whitehead of Foster + Partners, Lars Hesselgren of KPF, Jay Parish of Arup Sports, and Dr Robert Aish the then chief scientist at Bentley Systems. Affiliated education institutions included the Architectural Association School of Architecture (AA), MIT, Delft Technical University and the University of Bath. The SmartGeomtery group organised workshops and seminars to educate the industry on the benefits of parametric design, scripting and digital manufacturing

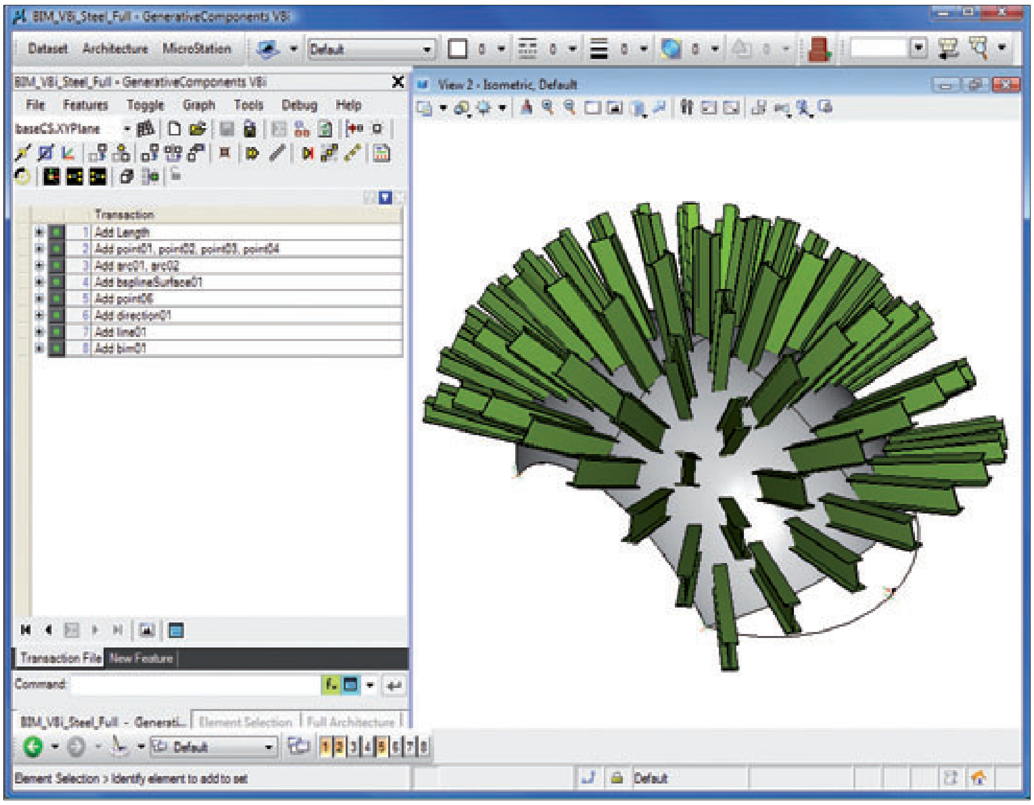
Eight years on and to say things are going well would be a huge understatement. Parametric modelling and an explosion in interesting architectural sculpted forms is literally revolutionising our city landscapes. Many of the architectural lecturers I know have difficulty finding words to describe the complex designs that their students produce — some aren't even sure if it is 'Architecture'. The days where 2D CAD was used to merely document a design for construction are gone. With an increasing number of options, from SketchUp to Bentley Generative Components, architects are finding ways of exploring 3D in highly complex ways.

This year's SmartGeometry event was held in downtown San Francisco and followed the now familiar format of workshop, alumni day and a conference day. Bentley Systems is the key sponsor of the event and so the workshops teach Bentley Generative Components technology, based on MicroStation, to a mix of both university students and designers from practicing firms. While students may let their imaginations run riot, those with jobs frequently try to use the training on offer to apply GC to an existing project or problem. This year there was the addition of a rapid fabrication room, where a number of Z Corporation rapid prototyping machines were available to produce physical copies of the generated designs.

"Using a quad core, 64-bit workstation to draw flat lines is like using a sledgehammer to crack a wallnut. With products like Generative Components and an emerging new class of applications, the sledgehammer can build green cities."



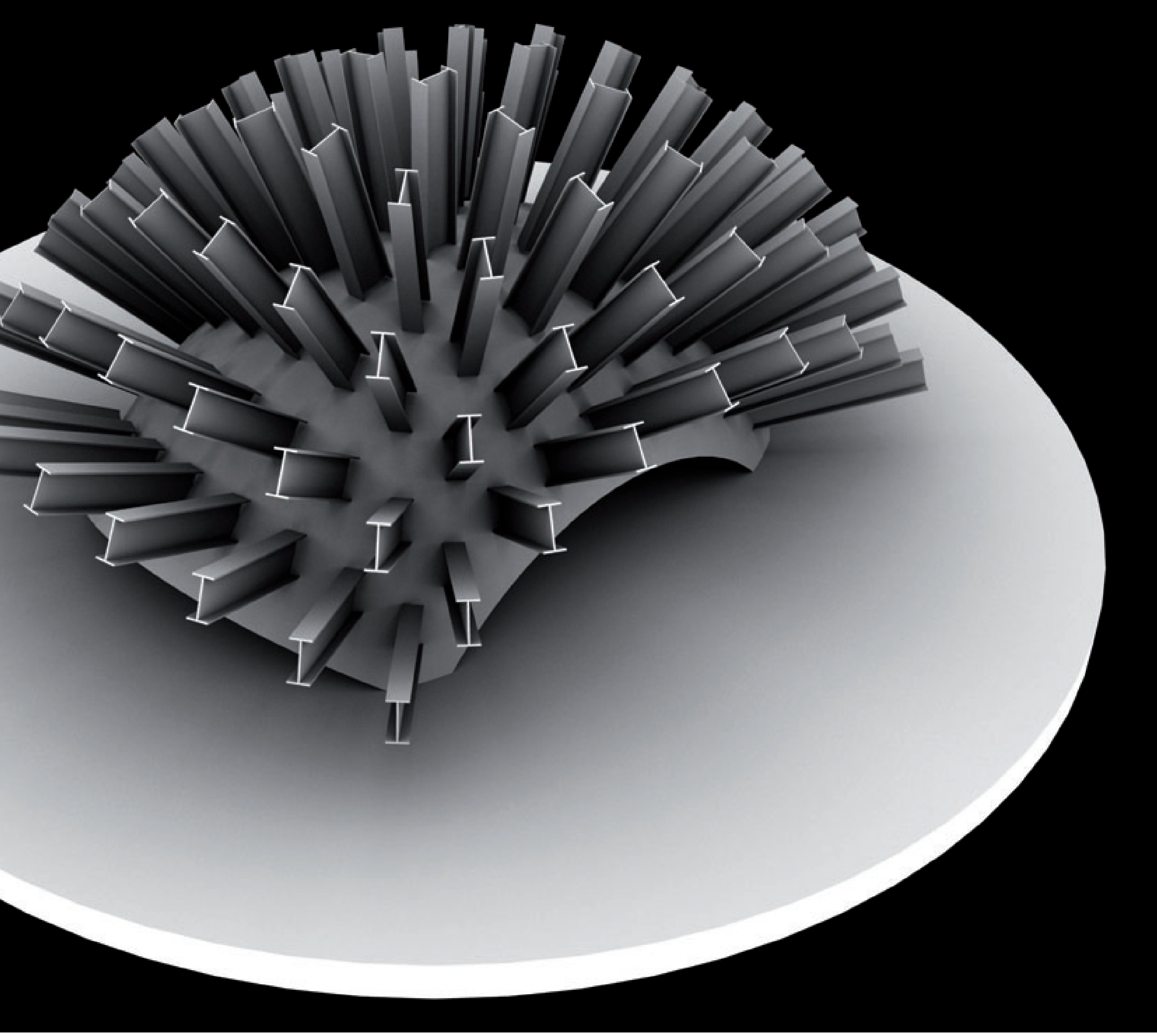
A rendering of the Generative Components steel beam array.



A model in Generative Components arraying steel beams over a surface.

New kids on the block

Generative Components is without any doubt the leading parametric system in architectural practices today. This is in part due to its MicroStation base and the length of time it was in extended beta, with Dr Robert Aish engaging with practices and architectural schools that wanted to participate. However it is clear that GC is no longer the only game in town, with McNeel Associates' Rhino-based Grasshopper technology gaining popularity, together



with architects using any number of other modelling tools to explore paramatrics, such as SolidWorks, Catia and SolidThinking — to name but a few. A year ago Dr Aish left Bentley Systems and joined its arch rival Autodesk to develop parametric modelling tools for architects and designers in AutoCAD. So the competition is heating up for expressive modelling tools and this is a great indicator as to the level of interest in this market.

Just prior to the first Alumi day, I met with a San Franciscan friend who introduced me to a local architect, Andre Caradec, who also lectures at the California College of the Arts. Mr Caradec invited me to the FLUX workshop and exhibition that was running at the same time as SmartGeometry. There were some overtones that FLUX was a response to competitive vendors which couldn't take part in SmartGeometry due to Bentley's long-term sponsorship. Indeed, the companies highlighted at FLUX were McNeel, Autodesk and SolidThinking.

Both events were about the same thing: educating students to use the 3D tools to create complex designs, and exploring modular assemblies, meshes, material systems and environments. At the exhibition many of the SmartGeometry hierarchy were present to wonder at the models on display.

The main display was a massive, internally lit, twisted sculpted form designed in 3ds Max, Rhino and Grasshopper. Mr Caradec had fabricated much of it in his garage with CNC machines and it is the largest Grasshopper project to date to be manufactured.

This was the second SmartGeometry since Dr Aish left to join Autodesk. While Bentley sponsors the event the content of the key presentations is independent. Attendees hear about projects that have been completed in all manner of CAD applications. It is not about what software was used, but the application of technology to solve design problems.

That said, GC was always to the fore and the new man in charge of the product, Makai Smith, was on-hand to update and explain the development work that Bentley had been putting into the latest versions. There was even a team of developers at the event to add to GC's capabilities should it be required in the workshop sessions.

During the two-day event attendees heard from the visiting lecturers and viewed the students' work

Parametric and script-based design

In the past most architectural modelling programs only provided tools to document the 3D design that the architect wanted to model. With the use of parametrics and scripting, it is possible to offload elements of the design to the computer and for it to generate the geometry based on basic inputs by the design team. Here there is a need for a tool designer — someone who understands the geometry, the software and the breadth of design limitations that the project team would like to explore. The tool designer models the geometric relationships that will dictate the final form of the design. The design team can then manipulate the values of these variables, causing the computer to regenerate the geometry until it is the best match of the brief.

Using scripting it is possible to generate full panelisation drawings, go straight to manufacture, have the system populate the model with the ideal louvre system to provide maximum shading for a specific time of year, or have the steelwork self optimise to best system. The options of using the power of the computer to refine and explore a design are really only limited on the in-house talent to drive and programme the system.

Parametric and script-based design

SmartGeometry 09 showcased no less than 40 presentations. There was a lot to take in and much of what is shown is either research or explanations of completed projects. Here, Martyn Day highlights some of the more exciting projects.

- Jenny Sabin of Sabin+Jones Lab Studio gave for me the most fascinating presentation. While being an architect and teaching architecture, Sabin and her students had been working with the University of Pennsylvania medical research laboratory. The process is one of mutual benefit, with Sabin helping to explain and model medical structures at a cellular level for the medical team, while she gets insight into nature's solutions for building structures and behaviour. One of her projects involved the modelling of 'forces between vascular cells' using 75,000 cable zip ties. The utterly stunning model is so large you can walk around and inside it.

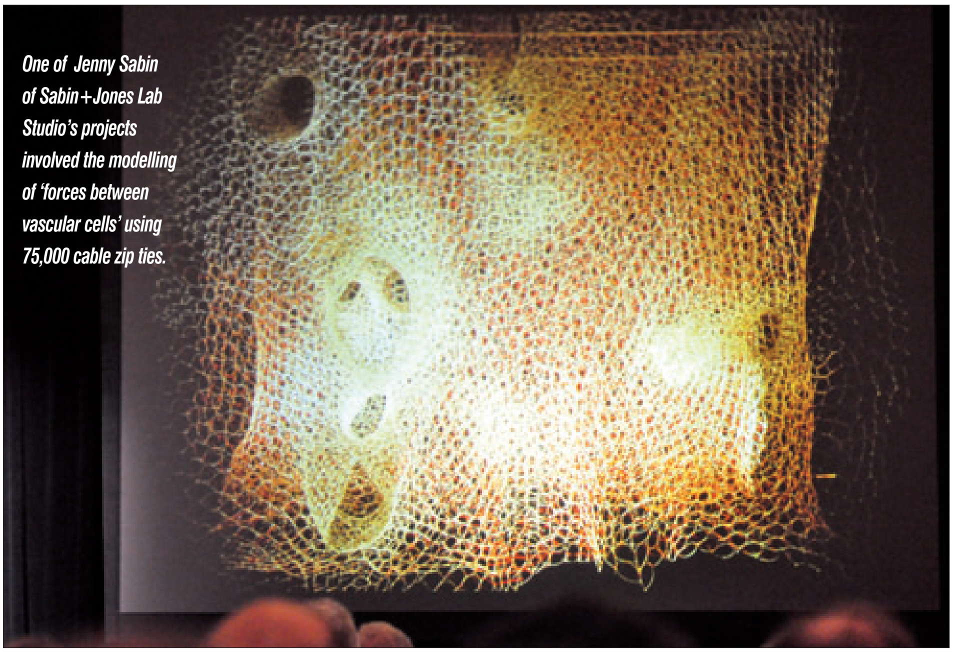
- James McBride of Mankani Power gave an astounding analysis of an individual's power consumption. Mankani Power is developing a kite-based wind turbine, which is currently being tested on the cliffs of Hawaii and is trying to play a part in the developing green energy industry. CEO Saul Griffith chronicled all the energy he has consumed in a year — and it wasn't a pretty picture. The basic problem is that people in the West have high power consumption, while in the East there are massive populations on relatively low power consumption. As the East's need for power grows the exponential requirement for energy will outstrip our ability to produce and we can't burn any more coal.

- Marty Doscher of the innovative and multi-award winning practice, Morphosis, gave an insight into how computer tools have liberated the creativity of its designers, enabling highly complex and original designs. The projects really speak for themselves. The interesting post note was the culture of the firm where some architects that went on site to work with the contracts sometimes "didn't make it back". This wasn't because they were hugely error prone, but because it was deemed a drawback to enhance their knowledge of how things were made. By thinking about limitations of construction in the design process, they felt that the design was compromised. Certainly a presentation for purists!

- Steve Downing of Arup and Dominik Holzer of AEC Connect introduced the concept of 'Optioneering', which is a programmatic way to look at all the options and trade-offs between multiple criteria in complex projects. With projects becoming more collaborative, if used early on, performance criteria can be weighted, driving analysis of all the designs done by various disciplines on the project, giving rise to the best design. This is being tested by Arup having developed a collaborative framework that connects all the digital project information from modelling products to analysis tools.



Students undergoing a Generative Components workshop at the SmartGeometry event.



One of Jenny Sabin of Sabin+Jones Lab Studio's projects involved the modelling of 'forces between vascular cells' using 75,000 cable zip ties.

- David Kasik of Boeing was an unusual presenter, introducing himself to the architectural audience as from a company that makes 'flying buildings'. He took us through the many permutations that Boeing has made to visualise the massive amounts of data that it created in the forthcoming 757 aeroplane. With literally millions of polygons, shortcuts have to be made and every trick in the book used to fly through the model in real time.

- Hugh Whitehead from Foster + Partners always wins the day for the quality of projects and beautifully rendered images. His topic this year was collaborative visions and their interpretation. Using the stunning Beijing Terminal 3 building as an example, he gave a walk through of the design, highlighting engineering features and architectural details. While Heathrow Terminal 5 took 20 years to plan and build, this gargantuan Terminal (the largest in the world) was completed in under five years. This was made possible by using the software to calculate and generate the parametric elements.

produced during the training class and four-day hands-on workshops. Every year the designs just get better and more complex, with everything from adaptive shading designs to the generation of internal spaces in tower blocks, derived from the movement of termites (termite mounds are, apparently, inherently good examples of self-regulating systems).

Conclusion

The overriding feeling I was left with from SmartGeometry 09 was that of convergence. Architects now can help and learn from medicine, aeroplane designers and mechanical engineers, to name just a few. The move to modelling presents us all with the same challenges and benefits.

With the concentration of presentations being about green issues and limiting carbon emissions, it is obvious that all things that humans design have a price to the environment — should that be a car, a plane or a building. With buildings estimated to produce 50% of the world's carbon emissions it is down to each industry to innovate and find solutions and to share these findings. GC used to be the only event that showcased exciting applications of computer technology, but this is increasingly no longer the case. With 'Rules Based Design Symposium' in Berlin, FLUX and a number of other events springing up the appetite for parametric design is no longer only for the signature architects.

While there is much to learn and the systems are still complex we are witnessing a change in the way we use computers and collaborate to solve design problems. Using a quad core, 64-bit workstation to draw flat lines is like using a sledgehammer to crack a wallnut. With products like Generative Components and an emerging new class of applications, the sledgehammer can build green cities.

www.smartgeometry.com

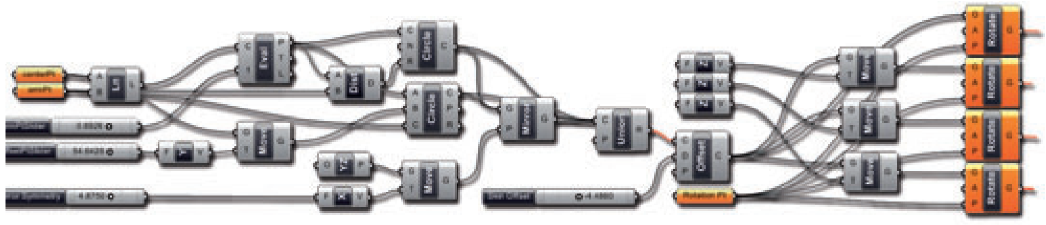
Rhino Grasshopper

Popular among students and professionals, McNeel Associate's Rhino modelling tool is endemic in the architectural design world. The new Grasshopper environment provides an intuitive way to explore designs without having to learn to script, writes **Martyn Day**.

Generative modelling is undoubtedly becoming one of the most exciting CAD developments adopted by the industry. While architectural practices lagged mechanical designer's appetite for 3D by about 20 years, there has been a sharp increase in the use of 3D and advanced form-creation tools and Rhino is one of the more popular solutions.

Rhino has played a predominant role within that move to 3D because of its low cost, ease of use and powerful feature set. Bob McNeel, the man behind McNeel and Associates, developer of Rhino, estimates that it possibly has around 50,000 architectural users worldwide. However, Rhino is developed to be a non-industry specific surface modelling tool, at home designing a yacht, a ring, a shoe or a skyscraper it produces surfaces that are useful for all designers.

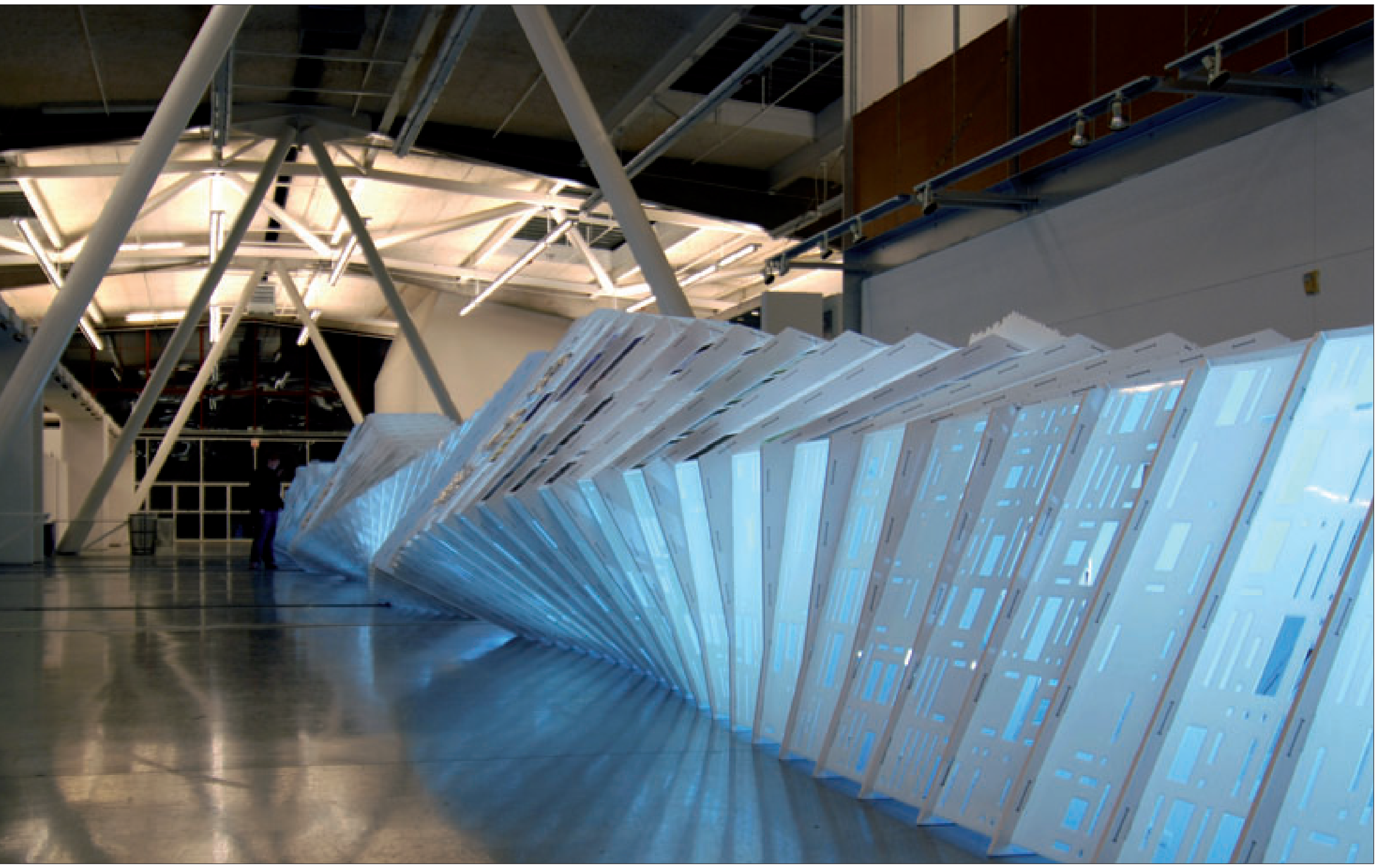
McNeel has developed a number of Rhino add-ons and plug-ins, mainly offering additional broad-functionality for rendering and animation in the guise of other animals 'Penguin' and 'Flamingo', as well as 'Bongo' and 'Brazil'. The latest enhancement is called Grasshopper and comes free of charge while it is in development. Aimed at the emerging generative shape designers, Grasshopper is tightly integrated into Rhino and allows the user to interactively drive geometry via a plug and play interface, removing the need for learning the RhinoScript language.



Grasshopper works within Rhino and uses standard Rhino geometry but has its own slick interface window. Algorithms and manipulators are dragged, dropped and connected, as if they were being wired together like effects pedals.

Bob McNeel said that Grasshopper was developed as an attempt to make scripting more accessible to users that wanted generative modelling tools. "During the design process, designers set-up sophisticated relationships between the parts of the design problem. Before Grasshopper, Scripting, .NET, or C++ code was the only way to do that in Rhino. Writing code is not something designers really want to get their head into. It seemed like most bigger firms have a few 'scripting geeks' that could not keep up with the designers' demands. So more and more designers were asking for scripting training... but then they hated it once they figured out how tedious coding was.

"Grasshopper is a way for designers to look at design problems as a set of sophisticated relationships and to map those relationships graphically and programmatically into a system that allows them to interactively play with alternatives. At first Grasshopper was very simple but, based on user



feedback, it now allows for very complete systems, including the ability for expert users to extend the system with C# and Visual Basic components."

Grasshopper works within Rhino and uses standard Rhino geometry but has its own slick interface window. Algorithms and manipulators are dragged, dropped and connected, as if they were being wired together like effects pedals. It is about as easy as it gets to use but still requires a methodology and understanding of geometry to get a desired result.

Rhino in London

Rhino is particularly popular with expressive London-based architects, such as Zaha Hadid, Buro Happold, HOK Sport and Foster + Partners. Fostering Grasshopper's usage in London is SimplyRhino, the largest Rhino reseller.

The company runs the annual Shape to Fabrication event which focuses on the use of Rhino and Grasshopper in modelling forms and shapes, through to complex engineering analysis and final manufacturing. McNeel programmers and even Bob McNeel usually make an appearance and are very accessible. The Simply Rhino Shape to Fabrication events are always complete sell outs and well worth attending.

Globally, Bob McNeel knows of 12,000 active Grasshopper customers, 90% of which are architects but admits there may well be more as users do not have to register to download. This liberal attitude permeates through McNeel's business model and means the company is very customer focussed, leading to a very active user community.



Zaha Hadid's Guggenheim Hermitage Museum, Vilnius. This will be the new centre for international art house pieces from collections of both the New York-based Solomon R. Guggenheim Foundation and the St Petersburg-based State Hermitage Museum.

One of the stand-out messages from Grasshopper was McNeel linking the modelling to fabrication. While other CAD vendors seem to only concentrate on the modelling aspect in creating the 3D forms, McNeel has always talked about what happens once the design is complete. "Our assumption is that Rhino is all about 'design for digital fabrication'. Rhino has always been about free-form shapes that are accurate enough to manufacture. Architecture is the only market we are in that still requires complete 2-D documentation. In all of the other markets, the Rhino 3-D model is used in all phases of design through to fabrication. In many cases without any 2-D documentation.

"AEC is only beginning to catch up. Many of the limitations are not related to the CAD technology, instead the problem is with the AEC business model where everyone is trying to protect themselves from being sued by the other members in the process. Lucky for us, free-form architecture has become very fashionable and it is not possible to fabricate those buildings from 2-D drawings alone. In general, I would guess that more than half of all Rhino users are on the fabrication side rather than the design side."

Grasshopper is being used and talked about by the same people that had advanced geometry needs and bought into Bentley Systems' Generative Components (GC). However, GC is script-based and requires training. It is also based on MicroStation, which has a parametric modeller, while Grasshopper uses a very visual plug and play interface to automate the scripting and is based on Rhino, which is a non-parametric surface modeller.

Bob McNeel admitted that the company does not know much about GC, "except that people tell us that it is harder to learn and use than Grasshopper. Since Grasshopper is very flexible, users can set up most any kind of relationship they like, so I guess you could say some of those relationships are parametric. But if the user wants to organise their generative model more like a script, it is more script-like. We are trying not to limit anyone's shape generation process by forcing them to think about it in a certain way. In most cases, Grasshopper is instantly interactive when you change an input (geometry or parameter) or when you change the definition."



This massive twisting form, above and left, was designed by lecturers Andre Caradec and Andrew Kudless, modelled in Grasshopper and digitally fabricated. It was recently showcased at the Flux workshops at the California College of the Arts (see page 11 for more information).

Performance

One of the biggest limitations of all parametric modelling tools is performance, it is very easy to create a script that forces the computer to make thousands of calculations and slow down. The shipping 32 bit version of Rhino suffers from the 2GB RAM limit. To access 64 bit it is suggested moving to the 'work in progress' Rhino 5 builds that are available. Bob McNeel explained the strategies to limit performance degradation: "Our goal is for the generative process to be completely interactive. If you make any change to the Grasshopper definition or an input, you see the change instantly. Of course, as the definition gets more complex and the model larger, it slows down. There are options to not regenerate every time you make a change. Also, it is easy to 'disconnect' part of a definition while you are working on others."

The Mac

McNeel has said that Rhino is available as a 'work in progress' for the Apple Macintosh and it may be some time before Mac customers will be able to use it. "Grasshopper is a .NET application. It is not clear how we will be able to get Grasshopper over to OSX. The Rhino for OSX is still in development and we haven't addressed any of the issues related to plug-ins yet," said Bob McNeel.

Conclusion

Rhino has always been an impressive modelling tool but with Grasshopper, it becomes a very powerful design exploration conceptualiser. The interface for developing the generative designs is worthy of an 'ease of use' prize and shames established products like Bentley's Generative Components. However, users still need to know what they are doing and how to get what they want from the geometry mathematically. The amazing work of Grasshopper users speaks volumes.

While Grasshopper is currently free, it may incur a cost in future. "Grasshopper is still in development. It will be free to all Rhino users as long as it is in development... at least another year. We are not sure yet if at some point it will be an option, or included with Rhino, or a special version of Rhino, or there is a basic version with Rhino and a full version option! In any case, it will not be a financial burden to anyone that wants to use it," said Bob McNeel.

McNeel has recently launched a new website for the Grasshopper community, which offers tutorials, a gallery and an active forum.

www.Grasshopper3d.com

Price: Rhino £890

London workshops

While the next Shape to Fabrication event is a year away, David Rutten, the main product developer of Grasshopper at McNeel, will be in London in July to hold a series of workshops with UK architects. Contact SimplyRhino (08456015970) for more information.

An introduction to visualisation

Jamie Gwilliam, Autodesk's visualisation and 3D application specialist, discusses some of the basics of composition and what we need to consider when creating a competent computer generated image and animation. This article covers many of his dos and don'ts, learnt during his professional career in architectural and product visualisation.

Before discussing what should form the basis of a good Computer Generated Image (CGI) we need to remind ourselves of the most important part of the process and, an area which is often overlooked, the purpose of the visual. We need to ask ourselves: 'What are the key points to communicate to the viewer?' It's all too easy when working on an image to lose track of the main reason for it. Instead we get carried away with the small, insignificant details. These small technical design details will often add little to the overall impact, mood and effect of the animation or visual. It's always worthwhile to draw up a list of five to seven important features that need to be communicated. This can be helped by re-visiting the original mood-boards for the scheme or product.

By helping to re-define the important differentiators of the project (for example the strategic balcony view or building's footprint), we can ensure the imagery enforces the important key points to the viewer and end client. Remember, your job when producing a 3D image is to portray the unique points of the project in the clearest way possible, and not just to make a pretty picture. With photorealism we aim to fool the audience into believing that what they see is real. With technical visuals, our sole aim is to educate the viewer in the clearest way possible.

3D visuals generally fall into one of two categories — to either sell an idea or to improve upon the design. Both areas often require two different styles of visualisation. For example, a marketing image will be quite different to one required for a planning submission or massing model. A good 3D image doesn't depend on the level of photorealism but on how well it matches its purpose.

Once we have outlined our brief and viewers, we start to create our test compositions.

If this is the first visualisation project upon which you are embarking then you should create as many test 'shots' as possible. Create quick block previews from all angles within the project. These do not need to be fully materialised renders, but instead can be simple hidden-line screen grabs or greyscale renders. By producing grey renders, we can also check our 3D model for potential defects, which may have been overlooked. At this stage, all we are concerned with is the form and mass. This part of the process should be all about speed and experimentation. Treat the project as though it were a real-world development in which you're running around with a digital camera. Take as many shots as you feel are necessary, then throw away the ones which don't work. This will help you learn which angles and compositions work well for your next project. Ensure, however, that you give no more than seven concept shots to the lead architect or developer

Artist's rendering by Neoscape — www.neoscape.com



Images courtesy of Yane Markulev, Smoothe Bulgaria www.smoothe.com





to choose from. Showing too many concept shots will often just lead to confusion and the client asking for a mix of a few, as they're unable to make a decision.

As a general rule, dramatic angles with large perspectives work well for tower blocks, whereas small dwellings benefit from a more refined approach where you would use a more natural lens. One concept which sits well with most visuals is to add a 'Dutch Camera' or 'Dutch Angle' effect. This is an early cinematic effect which often adds interest to an otherwise standard shot. Often, as seen in **Figure 1**, the horizon line needs to be tilted, and one of the perspective lines to run into the image's corner (top right). It's worth noting that this technique works extremely well if you wish to enforce the notion of speed and movement. The tilted angle will always add a level of drama to the visual too. Now look at the grey image (top left), and see how the composition's impact is lacking. On a side note, this grey look is a great way to test angles, without being distracted by colour. It also has the added luxury of a faster render/production time.

This technique can be seen in many of the visualisation specialists' work. Beware when creating animations, however, as it is easy to overdo this effect, and can result in a sea-sick end client. Also, experiment with the frame or image size to see what suits the effect. Don't get stuck in producing a standard A4-proportioned visual. In the same way the Dutch angle will add to the mood of a 3D image, a change in image proportion will result in a different mood. For example letter box proportions add to the notion of speed as a result of the larger horizon line which is available to the viewer.

Cameras

Try to understand the basics of how real world cameras work. Read up on principles of physical cameras and try to understand the basic terminology. Often the best 3D imagery and artists employ real-world principles. If anyone in your office has a SLR, then these are people who will become great 3D visualisers as they should already have an understanding of composition and common photographic terminology. This includes concepts such as shutter speed and film ISO. Many of these terms are used within the 3D visualisation process and as such, the two worlds are overlapping more than ever. Many visualisation beginners fall into the trap of forgetting they're in control of the camera and instead do all the shots at a 'safe' eye level. For extra drama in an interior image, try placing the camera in the bottom corner of the room and focus the target upwards to the ceiling. This will have the added benefit of making the space seem wider than it actually is, and will look less like a snap-shot.

Much in the same way that we look to cinematography and photography for inspiration, we should also implement their standard photographic and painting techniques. One such method is the 'rule of thirds'. This practice of splitting the image into nine equal imaginary boxes requires the horizon line to be placed on or near to one of the box's horizontal lines. This ensures the horizon is not distracting to the viewer by cutting the image in half. Implementing this simple technique the eye is held within the image for longer. The intersection of the box lines can also be used for the benefit of the 3D artist by adding strong focal points to this area of the visual. This can be illustrated by the two Spanish Antarctic base huts pointing towards the viewer forming a central area of curiosity, in turn retaining the audience's interest **(see Figure 2 overleaf)**. This remains one of the biggest challenges in visualisation. These meeting points are powerful places to add objects in an interior scene or focus on key exterior

Figure 1: *Dutch Camera effect is a cinematic effect which adds interest to an otherwise standard shot. In the right hand image the horizon line is tilted, and one of the perspective lines run into the corner.*



Figure 3: *Darkening the corners of a scene adds a sense of realism and also ensures that the viewer focuses on the centre of the image if there are no obvious focal points. Image courtesy of Alex Roman (ThirdSeventh) http://thirdseventh.cgsociety.org/gallery*

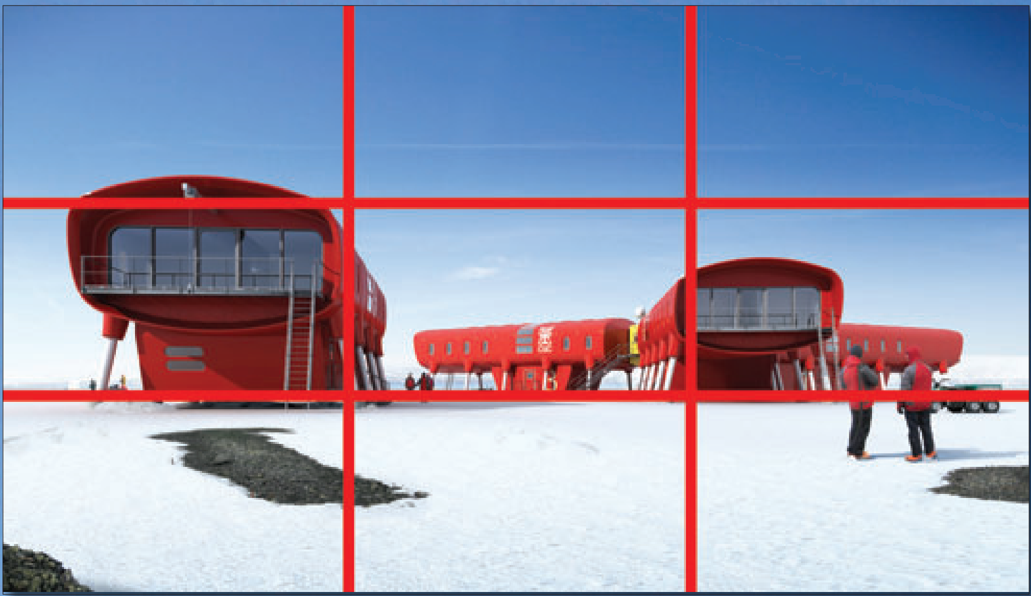


Figure 2: *This image of the Spanish Antarctic base uses the rule of thirds. The horizon line is placed on one of the box's horizontal lines so it does not distract the viewer by cutting the image in half and the intersection lines add strong focal points to the visual. Imagery courtesy of ARC — www.arc-media.co.uk.*

parts of the development. Next time that you're using your compact camera, look out for this grid, on the camera's viewfinder or screen.

Control

The rule of thirds ensures we are able to hold the viewer's attention in the image, but by adding subtle elements into the visuals and animations we can control or predict where the viewer's eye will travel. There are many procedures we can implement, but it's often the simplest that has the most effect. Now let us look back at the previous expedition imagery. We can see how the audience's attention is drawn into the image by more of these imaginary visual lines. We can imagine these lines drawn along the two front facing huts, roofs towards the centre of the image, forming a 'V' – thus leading us into the important background detail. In this case, the effect is subtle, but can often be more obvious by literal lines created by a road and path or a power cable for a product. It is these simple techniques which distinguish a good, captivating image from an average one.

In the image in **Figure 3** on page 17 we can see what I describe as the *'Top Gear* effect'. In the corners of the illustration there is a very subtle darkening to the edges. This is what we often see when using a wide-angled lens in the real world. This darkening is the result of the lens-hood or shield we would attach to ensure no stray light gets into the camera's optics. The result of this is the clichéd lens flare of 1990s computer imagery. By adding this edge darkening we are also adding a sense of realism.

However, more recently this effect has been used to ensure that the viewer focuses on the centre of



the image if there are no obvious focal points for the viewer to latch onto. In 3D terms, when rendered into the image, it often has the added benefit of providing a quicker render time, due to there being less pixel data for the computer to analyse. Next time you're watching *Top Gear*, look out for this technique and see how the eye is forced to a strategic point in the sequence. Good 3D artists will make sure you pick up on the key elements.

This technique of forcing the eye to strategic places is best revealed by Depth of Field (DOF). DOF is the process in which a selective part of an image is sharp and in focus, leaving the remainder of the image blurry and less distracting. In **Figure 4** on this page we can see how, without the blur effect, the monitor screen in the foreground is the primary focus. With the blur added, this pushes the focal point back towards the security wall screen. The image is simply easier to look at. The artist forces the eye to concentrate on the part of the image which is sharp and full of detail, and important to the marketing of the project. This is a very effective technique, which generally works best on macros, or detailed close-ups.

As an example, this could be an interior shot which highlights a desirable basin tap, with the remainder of the room out of focus. In 3D image terms it is often best to leave this effect until after the image has been produced. Producing these effects are processor-intensive. To explore this workflow, I would recommend researching Z-depth and post-processing techniques.

Light and colour range

Colour will often characterise a mood and feel. It is important to revisit the mood board and inspirations for the initial design schemes to ensure the correct



Figure 4. ***In the top image, the monitor screen in the foreground is the primary focus. However with blur added in the bottom image, this pushes the focal point back towards the security wall screen, which is important to the marketing of the project. www.aedasimaging.com***



"Many visualisation beginners fall into the trap of forgetting they're in control of the camera."



Figure 5. *The use of colour is extremely important. In general, warmer tones tend to work with more classical designs and exteriors, while colder moods lend themselves towards ultramodern projects. 3D Imagery courtesy of Visualisation One www.visualisationone.co.uk*

theme is carried throughout the full design phase. In **Figure 5** we can see how the colour palette is from the same, warm tonal range. Now imagine the same image with a small red vase or a red chair. This would be far too distracting for the viewer and would therefore become an interruption to the flow. Colours should be considered in detail. These should be as much a consideration as the camera angle. In **Figure 5** we can also see how the lighting carries that same warm, tonal range. Now, once again, envision the image with a blue palette. This would leave the viewer cold and create an unwelcoming mood in the visual. Generally, I feel that warmer tones tend to work with more classical designs and exteriors, while colder moods lend themselves towards ultramodern projects that can exploit bluer tones to their advantage by means of strong modern reflections, creating the notion of expense or luxury.

"It is no longer just a 'fluffy' marketing tool, but can and should be part of the full design process."

Colour theory in itself can create a challenging area for an artist, but the best rule is to choose a palette and carry it throughout the scheme. Don't use too many colours. Lighting should fall into this same colour category and range. My technique is to quickly convert the image to black and white to see if the colour range works by highlighting any distracting elements.

Lighting can be a valued part of the image, and can often hide unnecessary, time-consuming detail. In **Figure 5** we can see how the external windows have over-exposed, super bright areas. Generally this is what we would achieve with a real world camera. The room would be perfectly exposed (by means of a light





Figure 6: ***The camera angle and use of leaves in the foreground suggest to the viewer the camera is placed within a tree to add a sense of realism. 3D Image courtesy of Creative Bureau creativebureau.co.uk***

meter) to show the detail within the room. However, because the room is perfectly exposed, this would result in the 'brighter' exterior being over-exposed and therefore appear super white.

Often, when recreating photography, it's best to obtain reference photography from the internet to match it against. In **Figure 5** we can see how the artist has recreated this effect perfectly. By doing this, our focus in the image remains in the interior. From a 3D point of view, this has an advantage for the artist by reducing the amount of data the computer package needs to analyse. Don't get caught out and produce an interior image where the externally viewed sky is a perfect Spanish blue. Ensure the lighting conditions and environment are plausible. When adding this effect, it is often worthwhile to balance it with darker areas in the composition. The silhouettes will often fool the user into believing that there is a much greater level of detail than apparent. It's also worth noting the soft and subtle glow around these over-exposed openings. This is where we can see the haze and dust particles within the atmosphere. I generally describe these 'glare' effects as ones you notice more when not there, than when they are. These straightforward, but effective enhancements will trigger the mind into believing it is authentic.

We can also employ some extremely straightforward techniques to add to the realism. In **Figure 6** we can see how the artist has suggested that the camera is placed within a tree. This has been achieved by the addition of the two out of focus leaves in the top right hand corner. These leaves also help to frame the image. In computer terms we can add just these two leaves to suggest to the audience that the camera is in the tree. Our imagination will insert the remainder of the tree. By seeing the background wooded area, and by adding these elements, we believe the tree line to continue to wrap around the building.

As 3D artists, this careful placement ensures that we have less work to do to the image. 3D imagery is often primarily about suggestion of detail and complexity. We can see how this theme has been carried through the image. Notice the shadow in the bottom left hand corner. This again suggests that a tree is present, but without the hard work of actually adding and rendering the physical tree. Foliage remains a sore point for architectural visualisation. Often there is more detail within the foliage than in the actual development which results in an increase in computation and rendering times. We can also see how the background has been become less disturbing, by the addition of haze. Haze can be described as dust particles within the air. This automatically conjures up a notion of great distance and depth to the imagery.

Summary

Visualisation has advanced considerably within the past three years, however, the basics of producing a good image have remained the same. It is no longer just a 'fluffy' marketing tool, but can and should be part of the full design process. Visualisation is a necessary part of the communication process to ensure a visually informed design. Finally, it's always a good idea to slow down and test compositions. Try to know and use the above rules and guidelines, but it is more important to not always feel as though you must stick to them. Study the work of other companies and decide what makes a good image. Choose images that you continue to look at and analyse what makes them attention-grabbing. Start by going back through the images within this article and see how many conventions they use from the above 'rules' we have discussed, if not all of them.

I hope that my guidelines above have offered some inspiration for those of you already creating visuals, and for those of you yet to try visualisation, I hope that this has encouraged you to try it in some form.

Ensure that you explore ideas and angles, keep things simple to start with and most of all, be creative.

About the author

Jamie Gwilliam is a 3D application specialist at Autodesk. To sign up for 'Jamie's Jewels', his dedicated email newsletter for design visualisation technology, simply email him at ***Jamie.Gwilliam@eur.autodesk.com***

Realising the dream

A pilot of the pioneering IES SketchUp integration causes excitement about sustainable design at Broadway Malyan.

The recent launch of the IES VE SketchUp plug-in caused great excitement at Broadway Malyan. "In many ways the interface was what we had been waiting and looking for," said Stephen Choi, sustainable design co-ordinator at Broadway Malyan. "We tried many of the interfaces between CAD design and energy/performance analysis tools, but none had offered the tightness and iterative capabilities we were looking for."

Ian Walker, head of environmental engineering was equally impressed. "The best part of Google SketchUp is the iterative, very tactile and malleable modelling capabilities; the best part of IES (Virtual Environment) is the variety and depth of analysis capabilities. Combined, you get the best of both worlds – the capability to undertake faster more effective energy and performance analysis in an integrated and iterative manner that works truly as part of the design process."

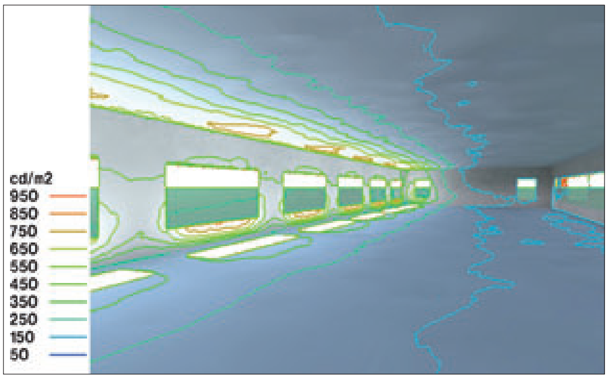
The IES VE SketchUp plug-in both enhances the capabilities of SketchUp and makes the quantitative green design power of IES more accessible. Since its launch in August 2008, Broadway Malyan has been piloting use of IES SketchUp on key projects in London and the UAE offices – including single dwellings, large masterplanning, streetscaping and mixed use developments.

Resource efficient design, technically informed staff and innovation are key company values for Broadway Malyan. The Sustainability unit works at several levels across the business; the 'core' unit supports key sustainability gurus in each office, while the rest of the practice maintains a general level of integrated understanding.

Kevin Leahy, main board director of Broadway Malyan UAE said: "Broadway Malyan is passionate about making sustainability fundamental to the design process throughout the practice and believes that the IES/SketchUp interface demonstrates an innovative way to adopt and embed new approaches and methods of working as part of a joined up, integrated team effort."

Stephen Choi said that the pilot had been incredibly successful. "We are planning to roll out use of the IES SketchUp integration at an exponential pace, and aim to have the software in common use by all within the practice at the end of 2009."

Ian Walker sees great potential for the software. "I think that this development could be as significant for the building design industry as the introduction of AutoCAD in the late 80's – it might just be the catalyst to joining up environmental thinking between the architect and engineer," he said. "The only successful way to approach sustainable design is through integration across the entire design process."



Internal light level distribution, luminance, in cd/m2: Broadway Malyan found that the ability to undertake environmental analysis helped ensure sustainable design ideas were maintained throughout the design and build process.

Improved collaboration

Broadway Malyan has found that the IES SketchUp integration has greatly sped up the process of undertaking quantitative environmental analysis at the very initial masterplanning and massing stages. How factors such as mass, orientation, shape, streetscapes and shading devices affect key environmental targets can now be assessed. It has brought design teams together and ensured that analysis is not an isolated, non- iterative activity.

"On a recent masterplanning project I was able to sit with the client and go back and forth on iterations with environmental feedback at each stage within one and a half hours. In the past it would have taken us two to three days to re-model the building before we could give any performance analysis feedback. The opportunity would have been missed," said Stephen Choi. "The level of collaboration we achieved was only possible because of the speed analysis could be undertaken.

"On another refurbishment project we needed to create an energy model of the existing building to use as a base case, but we only had PDF plans of the building. As it is so quick and easy to model in SketchUp we were able to create a 3D model of the building within 10 minutes and import it to IES using the plug-in in order to run the energy analysis," he continued.

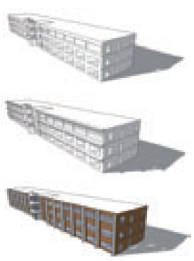
"As simple as it sounds this ability to quickly undertake environmental analysis helps us ensure that any sustainable solution ideas are not dropped as the design progresses and that the design is kept on track energy and performance wise. It enables us to look at how energy use, carbon emission, solar and daylight are affected at key design iterations right from the very initial stages and then at increasing levels of detail as the architectural design progresses."

Broadway Malyan also found that, as well as offering faster, more effective collaboration, the following business advantages were offered by the IES SketchUp integration:

- Reduced expenditure on external consultants;
- Trebled the output capabilities of its environmental engineers;
- Less re-design needed and ultimately better performing designs were achieved, cutting costs and increasing competitive differentiation;
- The combined visual power of SketchUp alongside the quantitative IES results provides incredibly valuable material for planning and other reports;
- Keeps Broadway Malyan at the cutting edge of sustainable design innovation.

"The integration has proven to be a useful tool for carrying out the necessary assessments and making designs better, and has promoted the key value that good design is sustainable design," said Stephen Choi.

"I noticed that on the pilot projects when the architects knew that their designs were being tested in a tangible quantitative method, the way they thought about the design started to change. This and the analysis feedback was a learning catalyst for them. A greater understanding of the non-visual effect the lines they were drawing started to grow and over time a better ballpark appreciation of what design elements mean in terms of energy use, solar and daylight performance developed."



The effects of design decisions on light and shadow. From the top: Without any solar shading; With horizontal solar shading; With vertical solar shading.

The future

Throughout the pilot both Stephen Choi and Ian Walker found it relatively easy to adjust to the drawing conventions required within SketchUp to ensure the smooth transition of the model into IES analysis. They were both impressed by the accuracy – "nothing was lost in translation".

"Critically, you do not need to fundamentally change the way you design in SketchUp, you just need to add a few conventions on top," said Ian Walker. "Consequently, we are confident that the combined use of SketchUp and IES will become so useful within Broadway Malyan that it will be indispensible."

Broadway Malyan is starting to educate key staff in the drawing conventions and how to most effectively use the IES SketchUp integration in an iterative way within the design process. The programme will grow exponentially until the integration is in use by all staff. It is hoped that this can be achieved by the end of 2009.

The 'good design is sustainable design' ethos promoted by quantitative analysis via the IES SketchUp integration has already made a great impact at Broadway Malyan. Architects get quick environmental feedback on design iterations and environmental engineers can input more into the design. More effective collaboration and cross-discipline understanding has been achieved.

www.iesve.com / www.broadwaymalyan.com

A civilised discussion

In recent years Autodesk has reinvigorated its focus on Civil Engineering. **Martyn Day** talked to **Adam Strafaci**, senior manager, Civil Engineering Product Marketing and **Dana Probert**, Civil Technical marketing manager at Autodesk.

There is no doubt that civil engineering design is going 3D. Model-based design is revolutionising all aspects of the building and construction market. To find out more about Autodesk's 3D products and ambitions in the Civil Engineering market AEC interviewed Adam Strafaci and Dana Probert of Autodesk's Civil team.

Martyn Day: Could you explain the transition from Land Development Desktop to today's civils products?
Adam Strafaci: Land Development Desktop came out of an acquisition called Softdesk, and was originally built for the US market. It wasn't really built with a global audience in mind and the original specifications didn't cater to different project types, such as transportation or environmental. As the business started to grow, it didn't make sense, from a technological standpoint, to expand LDT. Customers were looking for something that could handle multiple formats and they wanted a model-based environment. So we went back to the drawing board and started developing AutoCAD Civil from scratch.

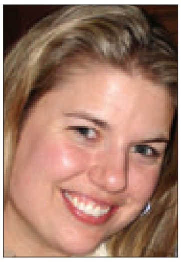
There are two variants, AutoCAD Civil and AutoCAD Civil3D. About a year ago, as we were adding more and more functionality on the analysis side of Civil 3D, making the system very rich and capable for engineers, we found there were many users on the document side of the process that didn't need tools like storm water analysis. So we created a version that didn't have all the analysis tools for the drafter and designer but it still uses the same model. Currently it's only available in the USA but we are working out better product differentiation to make it applicable to different geographies.

MD: Why build a 3D product on AutoCAD instead of developing something like Inventor?
AS: Within the Civil Engineering community everything is either MicroStation or AutoCAD-based. We stuck with AutoCAD because it's the tool that civil engineers are used to using and are most comfortable with. We kept all the native AutoCAD drafting capability but we built this rich parametric 3D model on top of AutoCAD.

Essentially we have created a number of custom objects. In highway design we have a corridor custom object, which is a 3D parametric object, which you can abstract information from. With our latest release of Civil 3D we have added quantity take offs from. So the transportation engineer can design the road and then extract all the quantities,such as the volume of pavement, from that model.
Dana Probert: Standard AutoCAD commands can be used as a foundation to build Civil 3D objects, such as polylines. Another example of custom Civil 3D objects in our 2010 release of Civil 3D are intersection models, we have a parametric object to generate intersections saving lots of drawing time.



Adam Strafaci senior manager, Civil Engineering Product Marketing at Autodesk.



Dana Probert Civil Technical marketing manager at Autodesk.

MD: Different countries have different drawing standards. How does Civil 3D handle this?
AS: We have these things called 'Country Kits', which include drafting standards, different types of representations and some custom functionality. For instance, in China we just added sub-assemblies for non-linear designs like highways, to make cross-sections. In fact with 2010, all the country kits are shipped with every copy of Civil 3D, as we recognise our customers work on global projects.

MD: What are the key areas of success and focus for Civil 3D development?
AS: We have three primary focus areas. One of them is undoubtedly transport, including roadwork, highways, railways and harbours. Then we have land development, which could be residential development, shopping centre, industrial. The third area is environmental and we are specialising in water resources like channel design, storm water management or dams. However, the product is being used in many different situations. We have made some significant progress in the last couple of years.

MD: The recent announcement from Autodesk and Bentley concerning the swapping of file format technology, so both firms can read and write each other's files, is great news for the industry and I would have thought would help Autodesk's civils products?
AS: Indeed, file formats have been a major barrier, a lot of the agencies require DGN file format delivery — they don't care how the design was done, they just want it delivered in that format. Compatibility is a huge plus for us, engineers can use whatever design tool they want and deliver in the right format for the agency.

PDF is also important and leveraging the new PDF features in AutoCAD 2010 will be great for our customers. It's important because a lot of government agencies require PDFs that are searchable and we know the support for TrueType fonts which makes that possible.

MD: Model-based design seems to be really taking off in transportation. What benefits does this provide over traditional working practices?
AS: One of the big selling points for getting our products into transportation is its support for machine controlled grading, so they can take the 3D model that is developed in Civil 3D and use that directly for machine guidance on-site. With some of the other tools out there, models need to be created after the design process, taking the 2D construction documents to build the 3D model after the case. With Civil 3D the model is a direct result of the design process. Our models remove the guess work so you can get very precise volumes.

MD: There is a lot of talk about Building Information Modelling (BIM) in civil engineering now, which started off as a buzzword on the architectural side. Can you have BIM in civils?
AS: We are seeing a couple of things. Civil engineers that are working closely with architects and structural engineers, where BIM has had a lot of traction, are being asked to participate in the BIM process, so that is creating pull-through demand in civil engineering. We are also starting to see the use of the term in transportation from large construction firms in the sense of allowing designers and contractors to share information like elevations, cross-sections, quantities of earthworks, so co-ordinated design changes can be made within the process. So we think it does apply; the terminology is not widely used but when we explain it a light bulb goes on and people get excited.

Civil engineers can embrace a BIM workflow by starting with getting the land use data into the design process to help inform design decisions early on. That then acts as the foundation of the BIM model. Then, after more detailed design work, you build out that model, and it becomes a foundation to collaborate with other disciplines, such as a structural engineer, using Revit Structure to design a bridge, now that we have interoperability between those two products. Taken further that model can then be used for simulation and analysis. There are some tools within the products as well as a very extensive network of partners that are building analysis and simulation that leverage the Civil 3D model.

MD: There is a big focus on Green and Sustainable design. What's happening in the Civil division to support this?
AS: When people hear the words sustainable design, they usually first think about what the architect can do with the building but the civil engineer plays a major role in sustainability. There are three main areas, the first is choice of location to reduce environmental impact. The second big area is around deploying design processes that minimise the construction area and prevent soil erosion. And thirdly is storm water,



minimising storm water run off, reducing the impact of water quality in the surrounding area. Our technology uniquely facilitates this in two ways: the model means you can very quickly evaluate many different design options, and the native geospatial and storm water analysis.

As to the future, we are hearing a lot from customers about the LEED[1] credits that rely on the civil engineer and are looking for automation. So they can go through their designs and see the impact on LEED credits as they alter the design. Of course, the problem with this is that the standards are still emerging, so it's a long term project but it's certainly doable.

[1]*[Ed — The Leadership in Energy and Environmental Design (LEED) is a green building rating system developed by the US Green Building Council (USGBC)]*

MD: How do you go about handling workflow and process?

AS: It really depends where you are. Japan, Korea and to some extent China, tend to have a couple of engineers designing and they may well not be hands on using software and they will be supported by hundreds of drafters. It's very 2D focussed. Then you look at the USA and Western Europe and it's completely different, with far fewer 2D drafters and the engineers that are adopting this model-based process, whereby the documents are a product of the model. We are trying to support both of those models and have introduced a product that is for Japan only and leverages AutoCAD LT with some civils functionality and a standards checker to meet Japanese drafting standards.

DP: Civil 3D is very flexible, a lot of the functionality that is included in our country kits allows customisation to meet many, many drafting standards without having to have the knowledge of programming.

MD: Autodesk has changed its subscription offering, from a yearly update to delivering more regular add-ons. Will this be the same for Civil 3D?

AS: Absolutely, we are always adding extensions and delivering them via subscription. Just in the last day we posted two new extensions to the subscription centre. One of them is a tool specifically for France, to do with their requirements for roundabout design, matching the country standards. The second piece of software is particularly useful for Northen Europe, it's an import/export tool for MX files, so data can be exchanged between Civil 3D and Bentley MX.

MD: With the popularity of Revit, are there any plans to deliver a Revit Civil?

AS: We don't have any plans to develop a Revit Civil but we are really concentrating on developing better interoperability between the Revit products and Civil 3D in a number of areas. One of them is around bridges and Revit Structure where engineers can take an alignment, a roadway centre-line, produce a surface model and bring that into Revit Structure for modelling and pass that information back. There is a lot of demand for bringing Revit models into Civil 3D and not just a dumb block. You would want to know the square footage of the roof area, for drainage design, or the building connection points for MEP pipes to hook up with pipes on the site. So 2010 is just the first cut at providing some level of interoperability between Revit Architecture and Civil 3D.

Transport is a key area for AutoCAD Civils including roadwork, highways, railways and harbours.

MD: The need to share data and adoption of 3D appears to be slowly changing the how companies work together?

AS: It's exciting to see this level of collaboration. There is a big project in upper west-side Manhattan and due to the complexity of the project, the owner stipulated that it be done in BIM. The Civil Engineering firm involved didn't really understand what BIM would mean for them and our reseller showed them the benefits of modelling and what really sold them on it was when they put everything together in NavisWorks — the architect's model, structural model and pipe work done in Civil 3D. They were quickly able to find some serious conflicts between the tie backs that were part of the slurry wall and the utility work that would not have been found till they had got to construction. There are definitely some tremendous benefits.


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Real web design

In the not too distant future, you may well end up launching your favourite design tool in a web browser, or never worrying about upgrading your workstation's RAM, graphics or hard disk. While investigating this story, **Martyn Day** has found out that the future is here.

We all know that 'everything is going online'. From ordering groceries, buying entertainment, to planning holidays or even finding/replacing a 'life-partner', it is now more possible than ever to never leave the house. We seem to have quickly adopted digital lifestyles and now take for granted the impact the Internet has had on our lives. However, I believe there is much more to come and a new technology announcement this month got me thinking about how the Internet could fundamentally change the way we use, access and pay for our design tools in the not too distant future.

While browsing the BBC news site I came across a story about a new company called Onlive (www.onlive.com). Later this year, Onlive will offer an almost unbelievable online service to computer gaming fans. The company will allow customers to purchase a wide number of games, in a variety of formats, and will host these on its top-of-the-range servers and workstations. It will then blast the graphics of the game being played to a web browser running on any operating system. This means that you don't have to have a high-specification computer or a variety of consoles, at home but can still get the maximum graphical experience. There is also the benefit of never having to download the games, which these days come on DVDs and are huge. This got me thinking, if it can be done for a 60 frames per second, power-hungry game, it can surely be done for 2D and 3D CAD applications?

After some further reading it seems that even the stock market took notice (for once) and industry analysts were claiming that if Onlive worked it could even be the death of such popular devices as the Sony PlayStation and Microsoft Xbox. With an Onlive account you would never need to have a specific games console, or ensure you have the latest graphics card, oodles of RAM or expensive processor. In fact you could probably even downgrade your current system. Onlive should give the same performance on an ATOM-based ultra portable, as it would on an Intel quadcore Xeon. Performance would only depend on the 'breadth' of your bandwidth.

Onlive Technology

For those of you not into games, bear with me. In the last seven years, Onlive claims to have perfected an interactive video compression technique, with ultra low latency (lag) — it literally encodes live video streams into data in one millisecond. This algorithm has been hard coded into a custom processor that comes in a little black box you acquire as part of your Onlive subscription, together with a software plug-in for browsers. If you have a 1.5 Mb connection speed Onlive claims you will get real-time games at Wii resolution (852 x 480 pixels) but with a 4.5 Mb Internet speed, the company is promising to deliver 1280 x 720 at 60 frames per second. Onlive has already signed up the major software vendors: EA, Ubisoft, Eidos, Atari, Codemasters and THQ to name but a few, and is due to go live in September 2009 in the US.

Onlive's web-based technology, which features a custom on-the-fly decoder and controller to interact with remotely hosted games, could also be adapted to deliver CAD over the web.



If the technology works, this really could be the first industry changing implementation of so called 'Cloud computing'. Cloud-based solutions are really in vogue at the moment, although not for delivery so much, more a discussion topic and as a future application development area. The basic principle offers dynamically scalable and virtualised (operating system independent) computing resources that are delivered over the web. There is no infrastructure required on the client side of the equation and everything is 'on-demand'. The 'Cloud' vision SaaS (Software as a Service), IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) are all seen as key future business models. Onlive delivers on all three.

"The concept that everyone gets the hottest hardware running their games irrespective of what they have at home seems incredibly liberating."

There has been similar technology delivered on a local level by Hewlett Packard with its Blade workstations, which operate in a thin-client manner. The workstations can be kept at a remote location and accessed via a simple terminal over a TCP/IP network. So, while the designers may be in India, the workstations they use and licensed CAD software could be, as an example, in Copenhagen. Onlive expands this concept to doing it over the public network (the Internet).

For a few years now, there have been conceptual ideas to try to utilise the Internet for running and hosting design applications but all have been limited by bandwidth and more fundamentally, the lack of native support for 3D in the standard browser applications. To get around this problem there have been attempts to develop and incorporate add-on 3D libraries for browsers but none have helped create a killer 3D application for the web. And should there be a 3D application running in a browser, it would still rely on the Internet bandwidth available, the graphics card in the machine and the grunt of the workstation's processor to run the application locally. The Onlive concept removes this barrier to the user by only streaming the video of the application.

CAD online?

This Onlive technology surely must be interesting to CAD developers who typically have some experimental web-based solutions at various stages of development. Well, I am just back from Autodesk's


RICOH

offices in San Francisco where I raised Onlive as a talking point to the AutoCAD development team, to which I was told that Autodesk were one of the 'less visible' strategic investors in the company. Knowing the numerous web tools Autodesk has been experimenting with on its Autodesk labs website (labs.autodesk.com), Onlive seems to be a perfect fit and potentially a decent financial investment for the firm.

All web browsers are bad at 3D unless you add one of the numerous plug-ins. It is perhaps not surprising that our industry could not agree on a standard but there are five open-ish popular development tools:

- VRML now reworked as a new standard, called X3D
- 3DMLW — 3D Markup Language for Web
- COLLADA — COLLAborative Design Activity
- Open GL ES 2 — a variant of Open GL
- U3D — Universal 3D format, developed by Intel

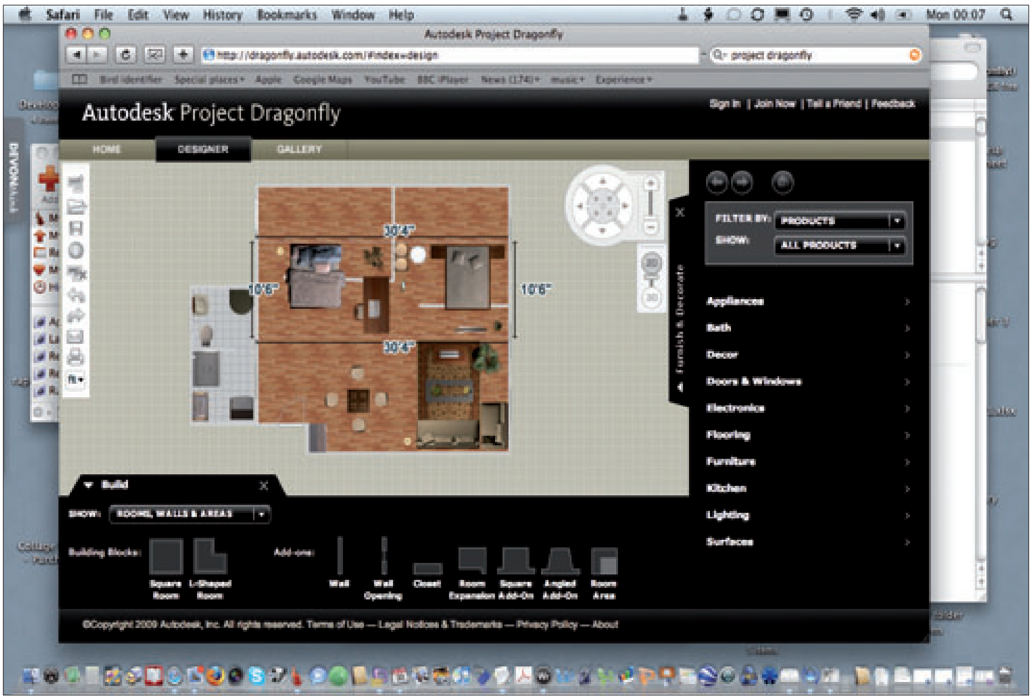
If you look around you will find many small 3D applications that utilise one of these standards but really only to view and maybe rotate basic 3D models which have to be downloaded. The general consensus is that they lack the necessary oomph to form the basis of an in-browser CAD application. One CAD company CEO insider told me: "Most of the 3D plug-ins are either junk or too specific. A ubiquitous one may come along but there is none now."

Having given short shrift to those emerging industry standards, I am going to add in some more jargon and mention RIA — Rich Internet Applications. This is an industry buzzword for providing enhanced development tools for browser or web-driven tools. Microsoft is pushing a .NET technology called Silverlight, while Adobe has AIR and Flash. These frameworks expand what is possible to be developed within browsers and provide web-tools with most of the benefits of desktop development tools, such as data persistence, access to locally stored data and integration capabilities.

All these standards and programming layers add hooks so the CAD developers can get their web-based applications to access the 3D graphics and other hardware in your machine. Web applications are moving beyond the browser and now appear to be hybrid applications. A little known fact is that this is being driven by modern phone operating systems, as developers need tools that will deliver applications for multiple target platforms, from low-power and thin-client to heavy workstation and servers.

On the actual delivery of a workable design application, everything at this stage seems quite experimental but eventually I am pretty sure the right combinations will create firm standards and open up rich web-based applications. That is, of course, unless cloud computing and video compression systems such as Onlive don't bypass these current software development limitations.

On that topic, Carl Bass, Autodesk's CEO told me: "OnLive allows for all kinds of computer-intensive applications to run well on fully powered servers and low power clients and, when it comes to platforms, I think applications in the near future will run on a number of platforms and it is hard for me to guess in the longer run if one will emerge as dominant."



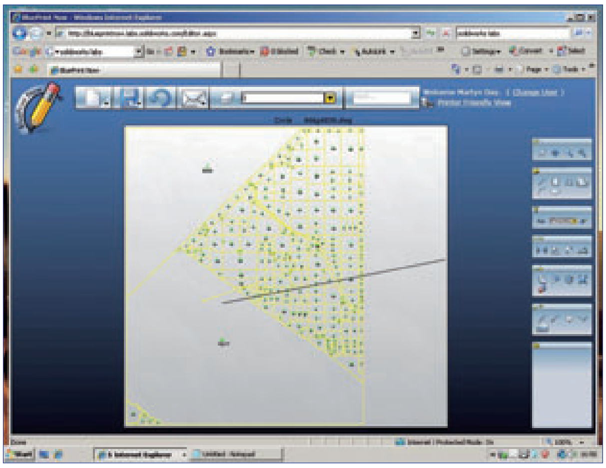
Project Dragonfly is one of the slickest web-based design applications we have seen. Currently on Autodesk Labs (labs.autodesk.com) there is a lot of functionality to help you space plan your office or home.

While Onlive is not available yet (outside of beta), there are some impressive web tools that show what is capable with today's cutting edge add-on 3D web technology. Autodesk's Project Dragonfly (dragonfly.autodesk.com) appears to be one of the more advanced web-based Labs applications that I have seen so far, where users can design interior layouts and spaces using drag and drop and axonometric views. While its interiors focus is limiting, It is well worth trying out to see how fast it works as a browser-only based application on your system.

There are a number of other tools in development, including Project Showroom — a cloud-based rendering tool for visualising interior fittings and colours, and Project Freewheel for DWG viewing in a web browser. (More on these in the following two reviews).

SolidWorks, the developers of the 3D product development system of the same name, also has a web-based DWG viewer, editor and creation tool called SolidWorks Blueprint (labs.solidworks.com). It is fun to try out and use as a DWG viewer but not particularly usable as an accurate drafting tool yet. SolidWorks offers a number web-based file distribution and collaboration technologies on its labs website.

SolidWorks Blueprintnow technology enables users to upload, display and edit DWG files with a browser.



At present there is not any serious commercial attempts at providing a 2D drafting tool, let alone a proper 3D solution in the Mechanical or AEC spaces. It would be interesting to see the capabilities of SolidWorks/Autodesk Inventor/PTC's Pro/E or Dassault Systemes' Catia in a browser but that is probably still some years off. In fact, Dassault has told me that it is working on delivering Catia online in the future but estimated three to five years.

Conclusion

While there may not be any serious commercial offerings in the market as yet, Onlive does offer the promise of fundamental changes in the coming years. We may not need to have workstations but share part of a 'super computer' that is situated somewhere in the middle of a desert. With a distributed model, the hassle of upgrading workstation components may simply disappear.

Not to forget, of course, the cultural issues such a change would require. It is still an issue for companies to externally store their mission critical data, let alone stream it live via the web around the world, while relying on the security and stability of third parties.

Before I get too carried away, this concept is all based on one thing: the reliability of fast, cheap Internet bandwidth. Countries that do not have the technology infrastructure are going to suffer. Even if each session took 1.5 Mb of bandwidth, in a room of 20 engineers you would need at least a 30 Mb pipe and while our Internet providers promise us much, they rarely, if ever, deliver the bandwidth they advertise. For instance, I currently pay for 20 Mb but am lucky to get 7 Mb.

As with most technologies, the games industry will lead the charge and we will follow. The concept that everyone gets the hottest hardware running their games irrespective of what they have at home seems incredibly liberating.

The lie of the land

Using 3D printing technology from Z Corporation, a German architecture firm famous for building state-of-the-art Formula 1 race circuits can now create precision 3D colour models of new building concepts and proposed track layouts.

Fifty years ago motor races were typically staged on disused aerodromes or closed stretches of public roads. These days motor sport is an international business especially Formula 1 where countries and cities compete to host one of only 18 or so races held annually around the world. Those aspirants who are granted the opportunity often commission stunning new circuits to 'wow' visitors and to impress the global media.

Modern F1 motor racing circuits are akin to small cities. Many have hotels, bars and restaurants, shopping areas and hospitality and media amenities, not to mention the usual facilities necessary to accommodate the F1 'circus' and its fans.

To make matters more complicated for the designers, the topography of a typical race circuit can be anything but flat, with hills, crests and drops all intended to make the track more challenging for the drivers and the race more spectacular for the audience. Building accurate models of a proposed new circuit, including faithful representations of the site, has, until now, been extremely time-consuming and very expensive.

German architectural and engineering firm Tilke has been designing Formula 1 circuits and on-site facilities since 1994. At one of its two offices in Aachen the company uses a Z Corporation Spectrum Z510/cx to build precision 3D colour models of proposed F1 circuits. One of the architects working at the conceptual stage of new projects is Bettina Noppeney.

"Before we had the Spectrum Z510/cx, topography was very difficult to model, as were complex building structures and details," she said. "Now, using images, we are able to print 3D colour models of the track and its surrounding area. We can also print finely detailed 3D models of the many buildings we design, which make up the circuit complex."

The Spectrum Z510/cx 3D printer is ideally suited to the office environment. It eliminates nearly all of the hazards, waste, noise, and disposal issues that are associated with typical rapid prototyping systems and is a compact machine, which needs little space to operate.

The man responsible for running the company's Spectrum Z510/cx is Franz Schleibach. Working with the firm's architects and engineers he provides 3D models of everything from structural components and electro-mechanical assemblies to large-scale composite layouts of a proposed site.

"Using the Spectrum Z510/cx we can present the client with an entire model of a proposed F1 complex. Before we invested in the Z Corp machine, we had to show the concept in 2D. When a client can see a model in 3D — and is able to physically pick up buildings, see how they are positioned relatively to one another and how they fit into the landscape — the effect is much more impressive."



The topography of a typical race circuit can be anything but flat, with hills, crests and drops all intended to make the track more challenging for the drivers.



Modern F1 motor racing circuits are akin to small cities. Many have hotels, bars and restaurants, shopping areas and hospitality and media amenities, which all need to be printed in 3D.

Tilke was founded by Hermann Tilke; a one-time racing driver with a background in civil engineering, and his Partner Peter Wahl. Twenty-four years later Tilke employs more than 200 people and has overseas offices in Mexico, Singapore, Abu Dhabi and Bahrain. Today, the company's expertise is in demand by clients also wishing to build unique sports facilities and clubs, including owners of private racetracks, golf courses and equestrian centres. Like motor racing circuits, topography is a major consideration for such projects.

"Even on the large, hand-made models we often need decorative details or extra elements to enhance our presentation," said Mr Schleibach. "For example, we can find objects online, which we can download as 3D CAD files and print using the printer." The Spectrum Z510/cx allows designers to output models in hours, not days, and build multiple models at the same time by stacking and nesting parts. "The result is that it takes a lot less time and money to build a large model."

3D models and product prototypes are about communication, and nothing communicates better than colour, which vividly renders architectural designs and landscapes. The Spectrum Z510/cx allows firms like Tilke to produce realistic colour models without paint and to better evaluate the look, feel and style of designs.

"As well as improving our model making process, the Spectrum Z510/cx has allowed us to pitch for projects in new areas," said Mrs Noppeney.

"We can also produce concepts much more quickly and to higher standards of finish. The machine has changed the way we explore ideas and how we present to clients."

www.zcorp.com / www.tilke-ac.de

"Using images, we are able to print 3D colour models of the track and its surrounding area. We can also print finely detailed 3D models of the many buildings we design, which make up the circuit complex."

Bettina Noppeney — *Tilke architect.*

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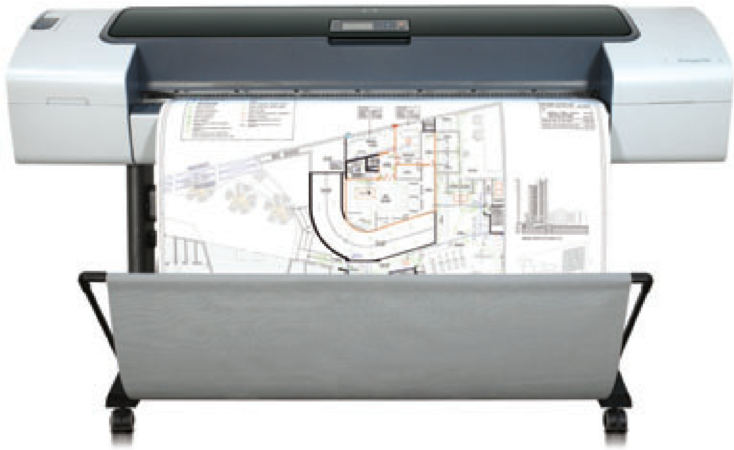
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HP DesignJet software

HP's large format printing division has just delivered what it calls a 'mid-life kicker' for its mid-range and high-end DesignJet products. **Greg Corke** takes a look at the software that is playing a major role in this evolution.

The new DesignJets

The **DesignJet T1120** (pictured) is a high throughput workgroup printer, available in A1 (24") or A0 (44") format. This single roll printer features three black ink cartridges in addition to standard cyan, magenta and yellow. This means it can print photo black for true black on glossy paper and a separate grey to help achieve better grey tones. Prices from £2,290 (24"); £4,030 (44").



The **DesignJet 4020/4520** is designed specifically for repro houses and large work groups and features two automatic roll feeds to offer more flexibility when printing on different media types and sizes. Prices from £6,840 (42").

HP's DesignJet printers need little introduction. They have led the large format inkjet printing sector since the mid-nineties, driving the technology forward by refining print quality and accelerating print speeds. Over the past few years, however, there has been a shift in development. With advances in print speeds and print quality slowing down, HP has concentrated on making its products easier to use and manage and software has been at the heart of this initiative.

In line with the release of its new DesignJet T1120, 4020, and 4520 products, HP has launched four new and enhanced software solutions designed to maximisw user productivity, enhance presentations and control and save costs. HP Instant Printing Utility 2.0 and HP Accounting Excel 2.0 are completely free to DesignJet customers, while Serif Poster Designer Pro for HP and SCP Reprocontrol for HP come at an additional cost.

HP Instant Print Utility 2.0

This free software tool is designed to make it incredibly easy for anyone to print large format documents, predominantly in PDF and HP-GL/2 file format, but also PowerPoint files (though you will need PowerPoint installed on the same machine to do this).

Printing from HP's Instant Print Utility can be as simple as right clicking on one or more files, choosing an installed printer and selecting print. The system can auto-scale, auto-rotate, and offer real-time print preview. For PDF and HP-GL/2 files that are scaled, a watermark can be automatically added to warn users not to take direct measurements off the drawing. The system can also be configured so prints are never scaled and will warn users if they won't fit on the paper loaded into a particular machine.

The software works with virtually all DesignJet printers, so even if you're not looking to upgrade to one of the new machines you can still enhance your existing investment.

HP Accounting Excel 2.0

This freely downloadable utility provides administrators with a simple way to manage and keep track of print costs for specific projects. Reports can be created which capture the usage tracking information of the printer, including supplies, media, user information, account information and the type of print. This information is sent to the administrator by email as a CSV file and imported into a Microsoft Excel template, which can be downloaded from the HP website.

In the technical space, support of HP Accounting Excel 2.0 is limited to the T1100/1120 series, 4000/4020 series, and the 4500/4520 series.

Serif Poster Designer Pro

This software tool is designed to help users create professional posters and banners with ease. While the results look impressive, it is unlikely to be of huge interest to technical users, not only because it is relatively niche, but because it costs £349.

SCP Reprocontrol for HP

Jointly developed with print software specialist SCP in Germany, SCP Reprocontrol for HP is primarily targeted at production operators in enterprises and repro houses to help take control of multiple prints. The software is a print workflow management system with full queue management capabilities and includes a full RIP (Raster Image Processor) for colour management, a built-in accounting system and unlimited job capacity. It supports all the major file formats including HP-GL/2, PDF, Autodesk's DWF, and a wide range of raster files.

These high-end credentials mean it is really targeted at companies with a minimum of two DesignJets and printers can be clustered so they work as one, which can help streamline projects to different printers.

Like HP's Accounting Excel 2.0 software, support is limited to the T1100/1120 series, 4000/4020 series, and the 4500/4520 series. Prices start at £1,495.

HP Web Jetadmin 10

While not a new product (release 10 was launched in October 2008) HP's web-based print management software tool is still worth a mention. It is designed to make the management of DesignJet and office printers more efficient and users can group network devices and configure them remotely, not only for network settings, but to carry out firmware upgrades.

The system can also be used to monitor consumables and can be configured to send an email when supplies are running low. The software is free and can be configured to work with non-HP devices.

Conclusion

In the past, print speed and quality were the headline grabbers for any new large format printer. However, while HP's new DesignJets certainly tick these boxes, it is the complementary software tools that currently make its products stand out from the crowd.

HP Instant Print Utility 2.0, for example, does an excellent job of bringing wide format printing into the hands of non-technical users, meaning anyone can print an engineering drawing providing a PDF file is available, while HP Accounting Excel 2.0 helps users keep control of project costs using a familiar Office tool. The fact that both of these tools are 'free' adds significant value to its new models, but it shouldn't go unnoticed that they are also available to existing DesignJet customers.

www.hp.co.uk/designjet

Dell Precision M6400

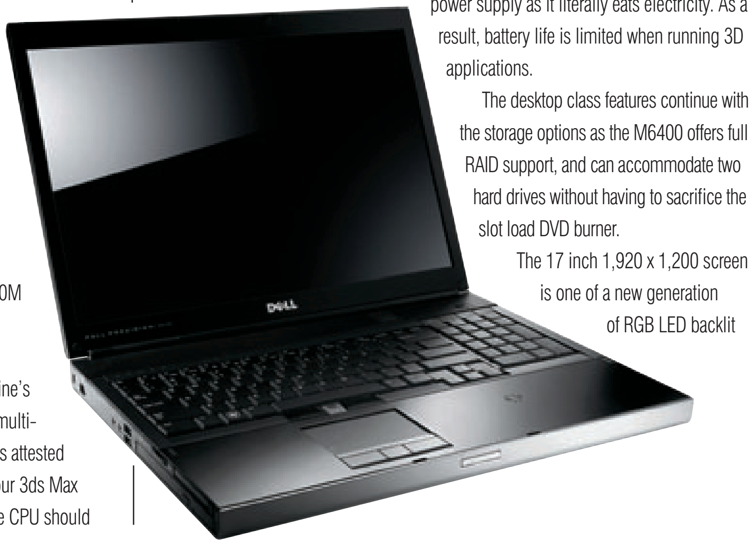
A high-performance mobile workstation with all the features you wouldd expect to find in a desktop, but like all machines in its class, it is not particularly 'mobile'. By **Greg Corke.**

It would seem someone at Dell has been taking industrial design night classes as the new Precision M6400 mobile workstation is like nothing you've seen before – well nothing you've seen before from Dell anyway. The sleek aluminum chassis gives the machine a clean look and you'll be pleased to hear there's no 'in your face' Dell logo to detract from its sleek lines.

Despite its good looks there is no hiding the fact that the M6400 is a beast of a mobile workstation. Weighing in at around 4kg and with a power supply that feels as heavy as a Mac Book Air, Dell's top end mobile workstation is not one for the road. It's a desktop replacement with the emphasis on desktop but is kitted out with some extremely powerful technology, including Intel's Core 2 Extreme Quad Core QX9300 (2.53GHz) processor, a 1GB NVIDIA Quadro FX3700M graphics chip and 8GB RAM.

With a concentration on multiple cores, rather than GHz, our review machine's strength lies in its ability to cut through multi-threaded calculations with ease. This was attested by the incredibly fast time put in under our 3ds Max Design rendering benchmark, though the CPU should be equally adept at handling analysis calculations. The M6400 is unique in that it features four DIMM slots so is able to get up to 8GB RAM without breaking the bank. If, for some reason, that's not enough, then the M6400 can even support 16GB with 4GB DIMMs, but expect to pay a premium.

The M6400 also makes light work of manipulating large 3D models and this is down to the powerful 1GB graphics chip, which is one of the reasons for the giant power supply as it literally eats electricity. As a result, battery life is limited when running 3D applications.



The desktop class features continue with the storage options as the M6400 offers full RAID support, and can accommodate two hard drives without having to sacrifice the slot load DVD burner.

The 17 inch 1,920 x 1,200 screen is one of a new generation of RGB LED backlit displays and is crisp and clear with vibrant colours and a wide viewing angle. An external monitor can be connected through DisplayPort, and with the optional docking station you can even run an additional monitor.

In terms of layout the M6400 looks surprisingly familiar, and with a full sized keyboard and glowing control buttons, it's hard not to draw comparisons with HP's Elitebook 8730w. However, the keyboard does not have the same solid feel as the HP and flexes in use, which was disappointing.

The Precision M6400 has all the features you wouldd expect to find in a desktop workstation and delivers exceptional performance in both CPU — and graphics-intensive tasks. However, due to the size and weight, portability is not exactly its strong point.

Specifications

Quad Core Intel Core 2 Quad QX9300 (2.53GHz)
8GB (4 x 2GB)
250GB 7,200RPM hard drive
Nvidia Quadro FX 3700M graphics (1GB)
Windows Vista Business 64-bit with XP 64 Professional downgrade
17-inch LED display (1,920 x 1,200)
From 3.88kg
35 x 393 x 286mm
Three year basic warranty (NBD)

Benchmarks (XP)

Graphics (bigger is better) 3ds Max Design 2009 — 156 Inventor 2009 — 2.7
CPU (smaller is better)
3ds Max Design — 1,155 secs

Price: £2,960
www.dell.co.uk

Dell Precision M2400

Unrivalled portability for a workstation-class laptop makes it a true 'mobile' platform for CAD, though 3D performance is limited under some applications. By **Greg Corke.**

Dell's Precision M2400 bucks a trend in mobile workstations of making them so big they become impractical to use as an everyday laptop. While most mobile workstations come in two sizes — 'big' and 'bigger' — by keeping three models in its range Dell is able to offer a machine with a 14.1-inch widescreen display as well as the standard 15-inch and 17-inch.

Just because the M2400 is compact and lightweight, it doesn't mean it's low on power, not in terms of processing anyway. While the Core 2 Duo T9800 (2.93GHz) doesn't offer the multi-core performance of the Core 2 Extreme Quad Core QX9300 (2.53GHz) processor featured inside Dell's Precision M6400, it is a much better (and faster) choice for straight CAD work. In terms of memory, our review machine was kitted out generously with 8GB, but 4GB would be much better matched to a machine of this type. This will also bring the price down considerably as 4GB DIMMS are still expensive and 2GB DIMMS can be used instead.

The limitations of such a compact machine are apparent when it comes to graphics. The Quadro FX 370 (256MB) is a good choice for basic 3D but performance in more demanding 3D applications, such as 3ds Max, can be disappointing.

Some will also see the screen as a hindrance, not so much due to its size, but its resolution, which at 1,280 x 800 is not ideally suited to detailed CAD work. However, an optional LED lit 1,440 x 900 display is also available and with DisplayPort and VGA ports fitted as standard, external displays are also fully supported.

The upside of having a smaller screen and lower powered graphics is that battery life is considerably better than the M6400. It is this, plus its compact chassis that put the M2400 in a class of its own for a workstation-class laptop. You probably wouldn't want to use this as an everyday machine, but for those that need a certified platform for CAD that easily pops into your bag for those business trips, the M2400 is well worth a look.



Specifications

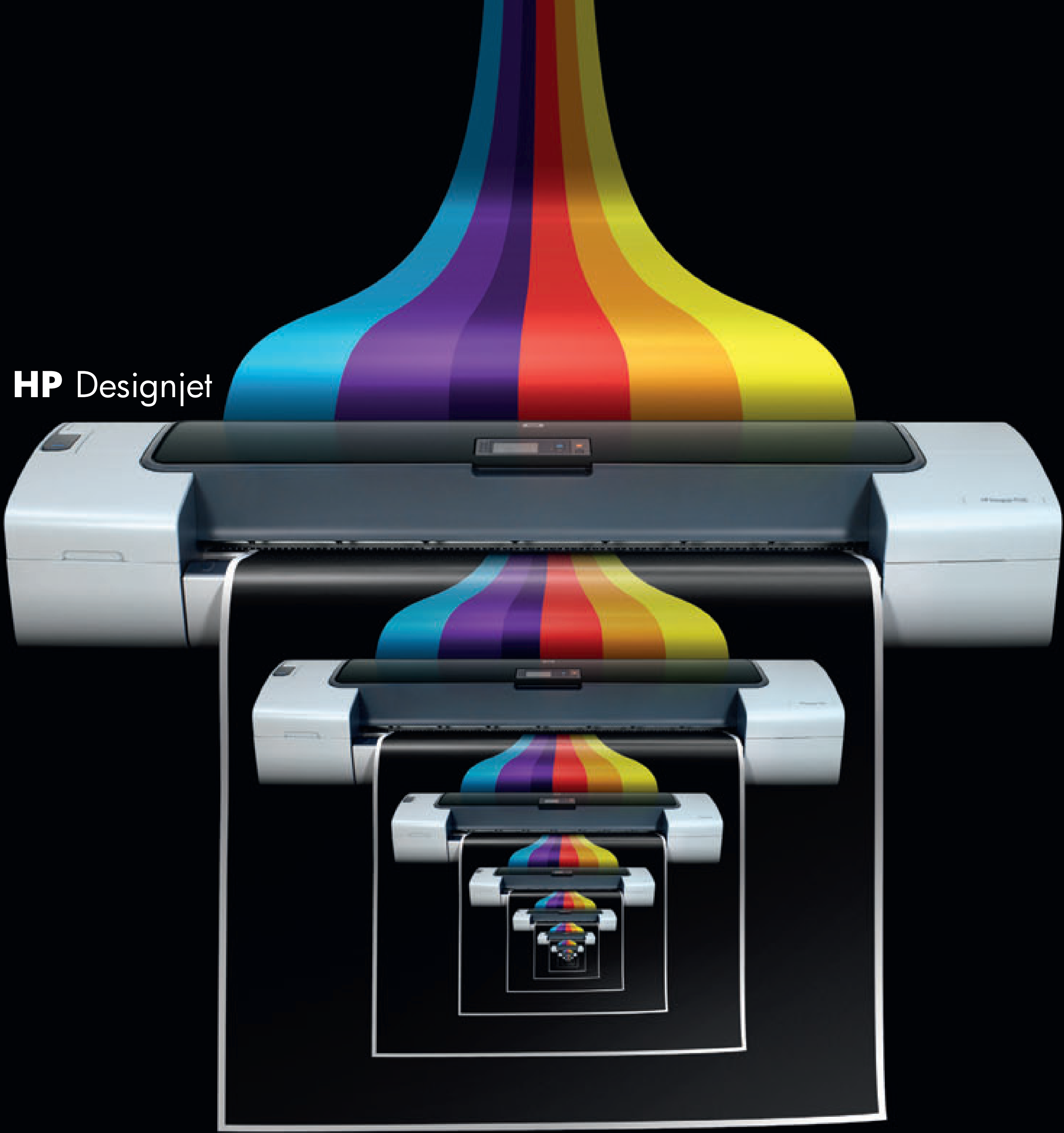
Intel Core 2 Duo T9800 (2.93GHz)
8GB (2 x 4GB)
250GB 7,200RPM hard drive
Nvidia Quadro FX370 graphics (256MB)
Windows Vista Business 64-bit with XP 64 Professional downgrade
14.1-inch TFT display (1,280 x 800)
From 2.16kg
26 x 335 x 244mm
Three year basic warranty (NBD)

Benchmarks (XP)

Graphics (bigger is better)
3ds Max Design 2009 — 97 Inventor 2009 — 3.2
CPU (smaller is better)
3ds Max Design — 2,005 secs

Price: £1,912 (£1,409 with 2 x 2GB)
www.dell.co.uk




HP Designjet